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Fosberg Field Book
No. 51

Collection and Field Note Book

No. 51

(March 22, 1958 - April 14, 1958)

(39317 ----- 39419)

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beginning
with #39317
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B & W Photos for this book:
58-1 to 58-6

Don't copy parts bracketed [ ] in red.

Print times in ( )
e.g. (7:15)

1958 Florida 1

March 22 - Flight from Miami to Managua
Left Miami 7:25
Everglades are gray-brown plains with low vegetation (sawgrass?) and vivid green patches of woods (hammocks). Much of the area seen is wet & even submerged.
Near Miami the plain is cut by roads and several large industrial plants (marl pits? cement plants?) mar its surface. The roads and areas around the plants are white. This area also has drainage ditches.
After this peripheral area roads and canals are scarce. The hammocks are mostly small and in places extremely numerous, in other places scarce.
(7:35) Some patches of sparse pine forest under plane and close to course. Several miles out, beyond a curved road, is a curious parallel arrangement of elongate patches of vegetation in the direction of the course, looks

1959 Florida

like drainage

7:52 This changes into spotty vegetation and a great series of lagoons and some flooded swamp-land, some of it mangrove, some a brownish-green lower vegetation. The lagoons are muddy to varying degrees.

7:56 crossed coastline, cape table scalloped & cuspate peninsula with a very narrow sand beach just to right of course. The Keys visible in distance to right, course following rather parallel to their direction but gradually coming closer. The water is greenish-muddy color north of Keys.

8:03 Some isolated small wooded keys north of main chain and highway have curious spits like tadpoles tails.

8:05 Large wooded keys with real estate projects. almost under plane.

8:06 Keys on both sides of course, mostly wooded, but many areas grassy or

sandy. amount of street development seemingly out of proportion to number of houses.

8:09 Islands exceedingly irregular in outline, separated by shallow water, many small lagoons.

8:13 Key West

8:35 ~~Windsor~~ Havana

Land around city almost entirely under cultivation, soil a bright hematite red.

8:40 West along coast a rather wide coastal strip of savanna, some patches of woods toward inland edge of it. Inland, is cultivated and some wooded patches, also.

8:43 offshore several miles a curved strip of island or bar cut by transverse channels - perhaps a barrier reef exposed by fall of sea level.

Inside this some islands with dark purplish red soil, partly wooded, very flat.

The "barrier reef" may be the landward edge of a large atoll-like structure. with most islet development

Cuba - Isle of Pines

on south, east side.

7:48 West end of Cuba to south in distance

8:58 Isle of Pines - southeast side very irregular, broad mangrove belt with some higher ~~sandy~~ areas, apparently of raised reef limestone, judging by pits.
Inland is dry savanna like area, very flat.
Westward entire south part of island is apparently a coral plain (possibly sandy but pits suggest rock) covered by dense low scrub or scrub-forest, very even, drab green.
Along coast some small irregular lagoons. To westward a coastal area of sand that is either rather young or is unfavorable to scrub vegetation, as it is very thinly vegetated, appears sandy.
In the south part of the island are no roads, not even trails, apparently.

10:03 Swan Island - visibility poor - building on west or northwest end, rest apparently wooded (or is coconut plantation). Has station for some sort of air navigation system.

Continuous clouds

10:37 Breaks in clouds show continuous luxuriant forest on somewhat rough terrain
Dull green canopy with lighter green emergents, a very few bright yellow emergents in flower - looks like typical primary rain forest.

10:40 Continuous clouds

10:46 small breaks in clouds, dense forest.

10:48 small breaks - dense forest
-51 as described above. A small river crosses course, dark water, not muddy.
Light green emergent trees conspicuous, numerous.

10:52 Clouds.

10:54 Breaks in clouds - dense forest
-55 stream at acute angle to course, not muddy

56 clouds

57 breaks - dense forest

58 clouds.

11:00 Breaks in clouds - densely forested
-11:06 low mountains. Dull green mottled with light green, occasional reddish flowering trees.
11:06 First clearing seen in forest. In this area pinkish flowering trees are common.
11:07 Large area visible - mostly in shifting agriculture and secondary forest, hilly, some hills covered with dense ~~scrub~~ forest, mostly deciduous at this season. Large winding river crosses course - wide sandy bed dark water, low at this season. Some slopes burned off.
11:10 Cloudy with some breaks - country similar to last.
11:12 Proportion of clearing becomes
-:14 greater, much pasture with scrub, small patches of forest, mostly secondary. Many roads. Some patches of sugar cane.
11:15 Country, still hilly, suddenly takes on a much drier aspect. Some sparse pine forest on higher ~~scrub~~ hills, hills mostly in brown a drab savanna, patches of gray-brown scrub or scrub forest.
11:17 Scrub becomes quite extensive,

relief becomes less
Lago de Managua visible ahead. Land about 1/3 x 1/2 in scrub a scrub forest the rest in cleared patches, dry grain fields and pastures, few gallery woodland very narrow along streams and ravines.
11:20 cross railroad, pass small town Trinidad? Very few clouds.
11:22 approaching Lake Managua the ground is almost completely covered by gray-brown scrub or scrub forest with conspicuous green gallery forest scattered yellow clearings, cattle trails abundant, relief lower. North of Tipitapa is a mosaic of scrub forest and savanna, very dry looking
along lake some large cultivated fields, brown, some very dark burnt umber brown. Narrow strip of herbaceous vegetation along shore of lake. Volcano on peninsula in lake has two crater lakes, slopes are covered by deciduous forest with scattered green trees. Crater lakes blue, Lake Managua muddy khaki colr. Plain between volcano and Motaes mostly

cultivated also strip bet. crater lake and lake, n peninsula.

11:30 Small volcano south of Managua erupting lots of steam and some ash.
Plain around Managua mostly cultivated, many fields plowed, some freshly burned. some in dry grass. Large cotton gin near airport.
Trees partly deciduous at this season.

11:35 Landed at Managua airport.
Plants observed at terminal:
Lawsonia inermis
Acalypha amentacea v. wilkesiana
Pseuderanthemum carruthersii
v var. atropurpureum
Araucaria excelsa
Melia azedarach
Nerium oleander
Croton dactylon
Ficus retusa
Bregnia nivea
Terminalia catappa
Hibiscus schizopetalus
Caesalpinea pulcherrima
Codiaeum variegatum
Zoysia tenuifolia
Bougainvillea spectabilis
Polyscias fruticosa
Mangifera indica
Cocos nucifera

This is obviously dry season on this slope.
Some completely bare trees of ceiba type, very large, thick conical trunks, other smaller bare species.

12:09 Took off for San Jose, C. Rica
On low hills about 95% of trees are bare, 5% bright fresh green. Soil is a light sandy color.

12:14 One conspicuous area of contour farming.
The country here looks generally rather depleted — erosion not of gully type, however.
Two crater lakes, caldera type, scarcely elevated above surrounding hilly plain.

12:16 Several sinks - holes a blow-out holes at base of volcano south of Granada. Slopes of this volcano wooded with mixed evergreen-deciduous forest, which becomes more deciduous as it runs out onto flatter low ground.

12:20 Isla Zapatera covered by deciduous, locally partly evergreen forest. Some evidence of recent fire.
Isthmus bet. Lake Nicaragua and Pacific a mosaic of savanna and forest

of deciduous woods. Lagoons along lake have areas of bright green marsh & swamps along shores.
Around Belen, etc. mostly cultivated some sugarcane, some may be pineapples - visibility very poor. Fields separated by hedges (?)
12:29 Ometepe Island - flat part near Moyogalpa mostly cultivated
Slopes of Two volcanoes wooded, Ometepe Volcano erupting some steam and ash. Forest here mostly evergreen.
South of this, on the south west ~~shore~~ side of lake the hills are wooded with mostly evergreen forest, but large areas of savanna probably secondary, as some burning actually going on now.
12:30 Mostly cloudy, some breaks show mosaic of savanna and semi-deciduous forest.
12:34 Break in clouds - solid evergreen forest.
Cloudiness complete.
12:38 Tempisque Valley in distance clear; mosaic of cultivation and wood. Mountain mass covered by clouds.

12:40 Clear. Hills partly open and partly wooded, evergreen forest. Little cultivation, mostly pasture. Southward mostly dry pasture, much burning, some patches of wood left.
12:44 Mountains again covered by clouds, valley in distance clear, rather dry aspect, especially around head of Gulf of Nicoya.
12:47 Mts. east of Gulf clear mostly cleared and in dry pasture but perhaps 10% in ravines and on steepest slopes in secondary forest. South, toward gulf thins out to bare savanna-covered hills with gallery forest.
12:50 Considerable area sugar cane (?) near gulf. Shore has a broad belt of mangrove.
12:52 Punta Arenas Punta Arenas
Hills s.e. of here covered by savanna and sparse deciduous woodland.
12:54 Inland hills with palm savanna. Some thin wooded. Ravines wooded, semi-deciduous. Much burning going on. Grass generally dry.
Mts. s.e. of San Jose brown with green wooded ravines almost to top, ~~some~~ scrub

on upper slopes and tops. semi-deciduous to evergr.

Plateau around San Jose greener, but still dry looking. Considerable bright green bananas, sugar etc. Maize fields brown. Deciduous trees here partly leafed out. Leguminaceae conspicuous. From ground the country looks rather wooded, but only because of fence rows, trees around dwellings, shade trees, etc. Some coffee with shade trees.

1:40 1:24 Took off from San Jose for Panama.

Bananas planted under and between Inga in coffee plantations.

Stream ravines deep and straight walled in here in volcanic material.

East from San Jose the country appears bare except for trees, but south in middle distance is considerable sugar cane.

Hills to east are dry with green ravines. Higher slopes of Volcan Turrialba are green, but largely cleared. Hills are heavily grazed.

grazing patterns visible even from air.

1:50 Turned back & circled to gain altitude, as clouds are thick around mountains.

1:55 Country very rough almost completely cleared except for ravines.

1:57 Country becomes somewhat greener, generally more woods left, sugar cane in flat valleys.

2:00 Large city surrounded by coffee plantations and woods. Probably Cartago (Turialba?) Then clouds over everything.

2:23 Clouds thinned and we seemed to be over the ocean, then closed in again. 5 distinct layers of cloud. Then a long period of dense cloud and rough weather.

3:07 Large opening in clouds - dense forest with some clearings. Visibility poor.

3:09 same

Clouds thin out. Continuous forest with evidences of shifting cultivation.

3:10 Layer of low clouds.

3:11 No clouds but a thin haze appears to be over ocean.

3:22 A small steep dry island.

3:14 another very similar island, a the same or, perhaps a
we no circlers. Mainly
grassy, small and very
guano-stained w bluffs
over sea.

3:16 Two larger islands,
steep, rocky, patchy
woods, patchy grass.
a landing and roads on
larger one. soil light orange red

3:18 Then still another, a little
larger and thinly wooded.
These must be Taboga Islands

3:20 approaching Panama coast
at an angle. Visibility
very dull. Losing altitude
for landing at Tocumen.
Beach muddy and very
shallow here, 2 line of breakers
Well developed strip of mangrove
along shore then a few cleared
sand ridges with Panama forest
largely Cecropia. Then
a scrubby bright green forest
with patches of a low
even gray scrub. Then
cultivation and pasture,
much burned grass.

3:25 Landed Grass dry.

Relief map of Darien + Choco in
airport shows inundated
land along lower Rio Bayano, entire
lower Atrato, and narrow strip of

Rio Bayano to opposite Narila.
Lower Rio Bayano and coastal
strip from Cabo Corrientes south.

Cult. at airport:
Ruellia longifolia
Coccoloba nucifera
Codiaeum variegatum
Cathranthus roseus
alpinia purpurata
Hibiscus hybrid

4:15 Took off, pass Tocumen for
Barranquilla.
Low hills covered with
savanna at end of airport
and for some distance,
ravines with scattered
trees. and
Then flat grassland
cut with wooded ravines
and then the coastal wooded
belt with meandering
tidal channels, then
a large area of marsh
before coming to a large
drowned river, probably
Rio Mamoni.
Following up this, there
is wooded land with some
clearings & patches of grass.

4:30 Visibility gradually lessens
by haze. When there are lots
much clearing is seen nearing

11:24 Solid forest through opening in clouds.

4:27 Reached gulf of San Blas - shores wooded a mangrove visibility poor.

5:30 Hole in clouds - rather dry country mostly geometrically cut up.

March 28 - Air trip, Barranquilla To Medellin via Cartagena

Sept. 6:50 Around Barranquilla is a sparse deciduous thorn woodland, most of which, in the vicinity of the city, has been cleared at one time or another, and the fields being separated by thin hedge-rows. Mostly in pasture rather than cultivation. The general pattern west toward Cartagena is a patchwork of fields in various stages of succession, mostly rather bare, but some presenting a savanna appearance, others a scrub woodland, along ravines it tends to be green. Many fields have been burned over very recently. Most fields are brown, but

occasional ones are green.

7:05 Some patches of well-developed thorn woodland, also a desiccated pond, the central part very gray. Then some rough hilly land, cut by ravines, that is half surrounding a small lake with no outlet. Then an area of green cultivated fields. This is only a mile or two back from the coast. Then more pastures, not quite so dry looking and with tiny ponds or water-holes very frequent constructed by damming small dry watercourses. Then an area of very low hills, heavily grazed, with gallery forests that are green along ravines and dry watercourses, many of these dammed to form small reservoirs. Some cultivation, mostly pasture. Then some savanna-like pasture with large flat-topped trees. Then much sparse deciduous woodland, especially close to coastal lagoons. Just east of Cartagena around lagoons

1958 Colombia

is some slight development of mangrove. Some small mangrove patches in harbor and around airfield.

7:15 Landed at Cartagena

8:53 Took off for Medellin. Small hills near airport covered by dry scrub. Considerable mangrove swamps around lagoon west of Cartagena. Then bush with patches of taller deciduous forest back of mangrove. South along coast a mosaic of patches of cleared dry vegetation and thornbush in various stages of ~~reg~~ development some patches of taller deciduous forest. A large canal follows course

8:03 crossing it to eastward. ~~It~~ intersected by smaller curving channels, these possibly natural. Large ponds of black water with light green floating vegetation, perhaps Nymphaeaceae along margins. Some taller forest.

8:05 Landscape ~~drained~~ by large

8:17 Large savannas, obviously cleared because of some angular patches of vegetation. Visibility very poor. Country looks eroded.

8:19 crossed a conspicuous road. (San Marcos ??) (a life line road?) Somewhat denser vegetation south of it. No visibility.

8:41 Green forest but with many dry looking clearings, locally over 50% of area, but seems to be a typical shifting cultivation pattern, with various stages of secondary forest. Much recent burning

8:45 crossed a large very muddy river, probably the Cauca. Caucasia Forest here probably 75% cleared, much recent burning.

8:47 Course parallel to meandering river.

8:48 Somewhat more forest. Clearings green except where recently burned. Forest green but with many bare emergents.

8:50 Preponderantly forest, with some clearing, especially along meandering ~~river~~ stream channels. Country flat.

8:57 Country begins to be dissected and is now entirely forested, no clearing at all.

8:52 A few tiny clearings along small streams, otherwise forest - no obvious trails or roads to these. Forest here has rather rough canopy, few bare trees, few obvious emergents above general canopy though with such irregular canopy this is hard to s[ay]

8:54 Small dark water streams with local rather large clearings near a main intersection of streams. In distance to west the escarpment down to the Cauca is visible. This forest is montane and the land has reached a rather considerable altitude

8:58 Relief very strong, with large ridges and deep canyons, all entirely forested. The forest on the ridge tops of a much finer texture than on slopes.

9:00 Much cleared land in middle distance, on steep slopes, mostly pasture, perhaps 40-50% of area. Some roads there. Very little clearing along course. Landslides frequent.

9:02 Suddenly almost all is cleared (dry) perhaps 80%. Roads and

dwellings rather common in this large river valley leading west down to the Cauca

9:04 Much relief, perhaps half cleared. Much recent burning. Trail along ridge tops. Large ridges

9:05 leading up, parallel to course now mostly cleared and in pasture.

9:07 Almost entirely cleared, in pasture, many bright orange-pink erosion scars. Grass very thin, soil showing through.

9:08 Villages and roads, now perhaps 20% forest but native pine, mostly.

9:09 Grass looks somewhat better, but erosion scars conspicuous. Soil dull pinkish orange.

9:10 Small city on small river. Perhaps Manizal. Manizal

9:11 About 40% cleared - patches of forest on some hill-tops and in some ravine heads. Grass in better condition.

9:12 Large valley of Rio Jorge. Jorge

9:13 Mts. perhaps 85% cleared, ravines generally wooded here slopes and ridges with exposed rocks some cultivated land

9:05 Very little forest left, some degraded wood with scattered trees. Gentler slopes a patchwork of cultivated patches, especially bananas, and pasture.

9:06 Steep slopes, mostly in pasture, much of it very thin, some wood in ravines, much rock.

9:07 Mostly poor pasture with abundant scattered bushes in valley, some patches of thin brushy woods. Grass Elvira, prob. Medellin.

9:09 Much conspicuous erosion, bright orange red soil approaching Medellin.

Hills around city almost all cleared and recently burned. Some poor scrub.

Mar 22 - Medellin - Quibdo

10:15 Left Medellin airport.

Grazing pattern very noticeable on some of foothills west of Medellin. Some hills rather brushy. Ravines generally with trees, these mostly shade for coffee. Perhaps 10-15% of land in coffee, rest in pasture, some bananas. Many

houses. Some small citrus groves, geometrically arranged. Many roads and houses on tops of ridges.

Percentage of pasture less as we ascend hill to west. Some woods, mostly tangled secondary, more coffee. Hard to tell shaded coffee from secondary forest. Gullies noticeable in some slopes and ridge.

10:25 General landscape grassy with wooded patches covering perhaps 20% or 25%.

10:28 More and more clouds higher up.

10:28 Perhaps 50% wooded, locally wooded less, especially low in larger valleys, which are mostly deforested. Higher peaks have forest or scrub.

10:30 Large valley almost completely cleared, broad ~~muddy~~ gravelly river entering Rio Cauca which here is very muddy.

10:37 Cauca Valley 90-95% cleared and in thin grass. Some reddish erosion scars.

Some small heads of ravines still wooded, only steepest ones.

10:35 Proportion of wooded patches increases on higher steep

1958 Colombia

slopes. Relief here is very great. Poor roads. Trails on tops of most ridges. Much coffee here.

10:37 Patches of woods with conspicuous white Cecropia. Perhaps 75% pasture, of wooded part half, many be coffee. Part of rest secondary woods, some good montane forest. Some ~~coffee~~ tree plantes without shade. Pasture

10:40 here greener than ~~cacao~~ in Cauca region.

10:42 More patches of good forest, much less coffee at higher altitudes. Greater part still cleared.

10:43 Some large peaks entirely wooded except lower slopes. Clearing now mainly in valleys. Perhaps only about 70% cleared, becoming rapidly less westward. Mountains very rugged much good montane forest. Valleys cleared, bright green. especially along road.

10:46 Very little clearing - relief much lower now. Forest mostly undisturbed canopy rather uneven. Rather little clearing here even along road.

10:50 Many clouds, visibility better

than good. Relief lower. Rivers here with dark water. Light sand-bars.

10:52 Some scattered clearings, in various stages of regrowth.

10:53 Village in large clear river running northwest some clearing around village. Road goes through village and 5 west.

10:55 another village on road at smaller less clear stream. No visibility.

10:56

10:58 Rio Atrato - enormous meandering muddy river. Quibdo. Dense forest in flood plain, some clearings along road running north from city, some along river and bayous. Many palms in this forest. Forest very mixed in composition with a loose canopy, a few bare trees, but very few.

11:00 Landed at Quibdo dirt strip - a short dirt strip.

Cultivated plants seen at Quibdo:
Alocasia macrorhiza "Bocadura"
Dieffenbachia maculata
Carludovica palmata
Colocasia esculenta "Yachin" "Yamon"
Axonopus compressus
Begonia sp.
Artocarpus altilis

1952 Colombia

Stapelia sp.
Malvaviscus
Clerodendrum thomsonae
Coleus scutellarioides
Bowiea patinoi
Passiflora quadrangularis w
with maroon fruits, light
yellowish green, dull white
within
Persea americana
Mangifera indica
Annona cornuta
Euphorbia cotinifolia
Cassia alata
Saccharum officinarum
Guilielma
Hibiscus (hybrid)
Allamanda cathartica
v. hendersonii
Musa paradisiaca
Canna sp.
Lagerstroemia indica
Eugenia jambos
Catharanthus roseus
Antigonon leptopus
Caladium bicolor
Euphorbia antiquorum
Rosa sp.
Asparagus plumosus
Polyscias fruticosus
Hibiscus longiflorus
Tabernaemontana coronaria
Inga sp.

1958 Colombia

Mar. 23 - Río Atrato above Quibdo -

Much erosion along banks. River evidently falling, large sand bars exposed, slumping in steep banks, present level 2-3 m. below level of flood plain.

On flood plain along river are many dwellings and clearings. Artocarpus altilis very common. Gustavia, Castilla, Guilielma, Musa, and other ~~cacti~~ planted ~~spec~~ genera. Soil is sandy and ~~yo~~ brownish gray. Along the banks Gynerium is common. On older sandbars a large low grass forms tangled mass. Musa planted back of this. Scattered large trees left from forest on flood plain. Flood plain on east bank extends several miles, then narrows out and the bank is cut into a higher terrace about 10-15 m. On west side is a broad flood plain. The higher terrace is

of a red soil Bluffs covered by a luxuriant macrophyllous forest of several species of Cecropia, Cecropia, Jacaranda, several palms, Heliconia, Carludovica and a number of small leafed trees. Bare slumps faced with talus at base covered by grasses. From river swings west and again there is a large flood plain with small farms. ~~Bana~~ Musa seems by far the most important food plant. Musa sapientum, M. paradisiaca and M. nana all present.

The river is much closer to the east side of the flood plain than the west, and much of the east bank is of cliffs. Lower part of cliffs is ~~sand~~ gray gravel, upper part a deep red or flesh colored clay. The surface of this upper terrace is locally much dissected.

A large Ficus and Apeiba very common on flood plain.

1957 Colombia (Chco)

Mar. 29, Boca Tarandó, Río Alrato, above Quibdo

Top of bank on flood plain near dwelling.

39317 (grass)
" first pioneer on beaches and sand bars.
" 19 Solanum
edges of thickets

From here, Boca Tarandó upstream there is flood plain on both sides, no bluffs.

Guadua is very scarce here. A large Heliconia is common along the shore at top of beaches and low edges of flood plain.

Gravel bars much more common than sand bars.

Samuriná

At a fork in the river is a village Samuriná in the middle of the fork on a remnant of high ground.

Above here the flood plain is composed of a layer of gray-brown sand to about 2 m. thick, underlain by gray gravel.

In places the sand layer is much thinner.

forming tangles

shrub 2.5 m. tall, fruits white, immature "sauco amargo".

Guilielma very common on flood plain. Some Mauritia and a slender caespitose arecoid palm.

Above the flood plain becomes somewhat higher, 3 m. or more, the gravel beds much thicker, the color of the sand red-brown. This is said to be typical of the areas where gold and platinum are mined, and some small holes were seen where gravel had been dug for washing.

(35 kom. above Quibdo but 20 km in straight line)

Below Samuriná Yuto (?) on the east bank is higher ground, but perhaps 5 m. of gravel and yellowish sand & clay. Gradually becomes higher and redder. Above town are bluffs 10 m. high. At town an exposure just above

water level of a yellowish gray fine bedded sandstone.

Above here for the first time the bluffs appear on the west bank, broad flood plain on east. Then the river swings across, and they are on the east. Between here and
Tocolloro - there is high ground at frequent intervals on either side. ~~There~~ The cliffs are covered by a macrophyllous vegetation of aroids, Zingiberids, and a large gleicheniа.
The bedded sand stone or shale shows up frequently at bases of the cliffs. In the inequalities of its surface lies a gravel.

(Basis of agriculture is plantain, maize and rice.)
Above Tocolloro the bluffs become higher, the vegetation more luxuriant.

Below Lloro on west side of Rio Atrato, above Quibdo
Wet cliffs, inundated in high water

39319 (creeper)
1 20 (scrubby)

These bluffs and ravine cut in them are covered by luxuriant tall forest, with abundant lianas and large-leafed Araceae. Palms scarce or lacking.

Boranda - a high bluff on the east bank, largely cleared, with several species of palms left. These may be generally present but concealed by trees.

Guadua is more common in the flood plains above Yuto than below, but only very locally.

Just below Lloro (Lloro) is a large farm, some sugarcane. Here the flood plain is about 2½ m above the level of the river. about 1-1.5 m of brown sand lying directly on the black bedded shale or sandstone, locally on gravel.

40 m. ↓

flowers pale lavender.

Mar. 23 Lloro, east bank of Rio Atrato, above Quibdo
on flood plain

3532½ 1 Gustavia superba — 55 m.
common understory tree
in abandoned clearings and
around dwellings. planted.

1 ½a Theobroma cacao — tree 6 m. tall, flowers
planted. small tree, cauliflorous. → in axillary corymbs,
petals rose-purple dotted
with white, staminal
mass yellow individual
filaments yellow at base,
purplish maroon distally
anthers yellow, fide v.d. (photos)

same - on dissected terrace of gravelly clay — 65 m.
3 22 Zamia — leaves 4, erect, reclining
rare in secondary forest in age, from a rhizome
6 cm. thick, 30 cm. long,
curved upward; sterile.

3 23 [illegible] — slender understory tree
rare in secondary forest 4 m. tall; fruit immature,
dark green, pertile
fronds erect, sterile

3 24 Trichomanes ? dentriculatum (Bory) Mett 4 Sadet. — fronds rooting at tips.
occasional locally in deep
shade at base of tree in secondary forest — shrub 1-2 m. tall; bracts
scarlet, corollas pale yellow,
fruit bright blue, fleshy.

4 25 Cephaelis tomentosa — weak shrub, stems green,
common in undergrowth leaves with silky sheen,
in secondary forest. juvenile leaves with purple
under surface, upper
surface dark green with light
pink raised veins. fruit
immature

3 26 [illegible] — weak shrub 1 m. tall.
occasional in undergrowth
in secondary forest

4 27 Schefflera — rhizome erect; fronds
in undergrowth in secondary forest somewhat iridescent,
ascending.

3 28 Trichomanes elegans L.C. Rich det. Lellinger 1978
occasional, terrestrial in
secondary forest

Mar 23 Tranja de Lloró

Small very new experiment station occupying the site of an old farm, on the floodplain. The soil is brownish gray silt. The plain about 200 m. wide. Of this the half closest to the river is slightly higher, forming a natural levee. Back of this is marsh to the foot of the slope up to the upper terrace. All of this is cleared, as is the slope, but mostly recently cleared. Some trunks are still lying on the ground, covered by creepers and weeds.

On the dissected surface of the terrace is thick secondary forest, with scattered old trees, many young ones, perhaps 1-3 m. apart, with thick undergrowth of shrubs and small palms, and vines.

The soil is a ~~red~~ yellow to reddish gravelly clay with up to several inches of decomposing ~~humus~~ organic matter filled with live roots.

The vegetation is covered by epiphytes - ferns, Cyclanthus, Araceae, bromeliads, etc. One species of Cecropia has conspicuous arched prop roots. A fair sized palm has stilt roots.

Several specie of Trichomanes, Asplenium, Costus, Cyclanthus, Cephaelis, Melastomaceae.

Guibodo - cultivated tree of Brosimum potabile with immature fruit.

Placentation gasteroid fruit subtended by a thin disk-like involucre, this by a pair of stipular bracts.

The endocarp is completely fleshy.

Stipules ovate - lanceolate carinate.

Birds were scarcely seen along the river. One white heron, one that may have been an anhinga, one large sandpiper and three unidentified medium small birds were seen in a whole day on the river.

1958 Colombia (Choco)

Mar. 28 - outskirts of Quibdo cut-over land, undoubtedly burned over also, has scattered large trees probably persisting from original cover. Many small trees and shrubs distributed ~~at~~ with spacing of 1-5 m. in a tangled mass of Gleichenia sp. Lasiea sp. etc.

Among the trees & shrubs are Cascaria sp.
Cecropia sp.
Vismia sp.
Lipanua sp.
Vernonia sp.
Banhinia sp. (vine)
Salicea ~~Paliurea~~ Hamelia sp.? (vine)
Psychotria sp.
many Melastomaceae
Isertia
Annona?
Borreria sp. (shrub)
a small palm

40 m.

The thickets vary in height up to 4-5 m. The gleichenia from 1-3 m. Small open spaces have a small specie of Dichromena, ferns of several sorts, etc.

3 39329 Dicranopteris pectinata (Willd.) Underw.
abundant between scattered trees forming dense tangles; pinnules glaucous beneath.

2 " (Gleicheniaceae)
common

3 31 Borreria
common in openings weakly ascending

1 32 Cespedesia
common stumps sprouts only, stems

1958 Colombia

Mar. 28 - Quebrada Platina
3 Km. s. of Quibdo
in second growth scrubby
forest along small stream

3 3 3 3 3 Cephaelis
3 very common

5 34 Sabicea
very common

3 35 Faramea
rare

3 36 Psychotria macrophylla K. & P.
occasional in undergrowth
in dense shade

Cut-over land, with
many scattered
tall trees remaining
from original forest,
the quebradas filled with
thickets, the ridges and
elevated lands more frequently
with Gleichenia tanglas
with scattered bushes
and small trees, especially
Cespedesia.

50 m.
↓

shrub 2 m. tall (others can
up to 8 m.), flowers white,
fruit immature,
green with white longitudinal
lines. Bracts white, caducous.

— twiner, flowers white,
— fruit purplish red, fleshy.
slender understory
tree 5 m. tall, buds
with lime greenish,
tube blue, open corollas
sky-blue; fruit immature.
— erect, unbranched,
~~base~~ dark green, bracts
dark green, leaves little.
fleshy, fruit white,
crisply fleshy.

Mar. 29 - flight from Quibdo to Condoto, to the east at Pangui northy to Andita, east to Rio Suruco south of Quibdo.

Riosucio

Rather complete deforestation immediately along rivers, scattered clearings for 1-2 km. from rivers.

The primary forest is dull green mottled with light green and reddish & brownish green.

Occasional small streams with clear water, reddish gravel, occasional small primitive mine workings.

Palms common in forest, left when clearings are made, at least some. Those with planted fruiting ones give to cleared areas the appearance of palm savannas.

Well south of Quibdo near Certegui there is considerable dissection with entrenched meanderings of small clear stream.

South of Certegui are occasional clearings in the forest; some new, some with secondary scrub.

North of Istmina west of

Rio San Juan the country is almost entirely in secondary forest and shifting agriculture. The range of mountains called Cerro de las Mojarras is very steep and of gray bedded sedimentary formation.

At Condoto is a large area of dredge tailings not or partially vegetated (photos).

(Here to n.w. of Istmina is almost entirely in shifting cultivation and small mines.

Northwest of this a small very much meandering river with vast white sand bars. Scattered shifting cultivation and large areas of good forest.

Another meandering river with some ox-bows, much secondary forest in vicinity. and some on to west.

Country becomes more dissected and heavily forested, except for clearings along small streams. Some palms here but less than near Rio Atrato.

Becomes quite rough to the west. Still a varying amount of shifting agriculture and secondary forest. Palms locally abundant in north-south valleys. No clearing after first sharp ridge ~~from~~ ~~mo~~ until after third. Then numerous ~~bl~~ clearings then high ridges - Serranía de Baudo - with tall forest.

Río Baudo (Baudó) very strongly meandering, reddish yellow with mud. Flood plain definitely not swampy but perhaps flooded at high waters. Some cultivation but not much. More rather high mountainy west of river. Cultivation only along rivers.

Here most of emergent trees are bare. Some light yellow

These mountains are much higher than the map suggests.

Densely forested, palms common, no cultivation.

Approaching coast nails of Nuquí. Much cultivation.

then mangrove swamps around a large branching estuary.

Small wooded islets in bay. On beach ridge is a very peculiar forest appearing from air like the Sabinita forests of Marshall.

North of this the coast is very abrupt and mountainous, with gray crescent shaped beaches. Mountains wooded down to high tide mark. Deep water up to rocky shores. Deep gorges, a few small rivers.

Puerto Utría - deep inlet, rocky islets, very steep shores on ~~south~~ west side of inlet narrow coastal shelf on south side.

Then the coast continues steep and very crooked, densely wooded.

Ridges roughly paralleling coast. Then long straight dark gray beach with little or no flat area behind it. Then steep slopes.

Back of coast in valleys parallel to it is much cultivation.

Then El Valle with a

El Valle

conspicuous estuary and cultivated valleys ~~as~~ running north, ~~the~~ they were inland.
North of this a very rocky shore wooded from top of beach up the steep slope.
Landslides show bright red soil.
Country back of coast on peninsula west of Mutis very mountainous and densely wooded. with somewhat open canopy.
Flat valley cultivated
Beaches of red-brown sand at base of bluffs.
Wet cleared land with grass east of Mutis in valley.
Back of this untouched forest. Valleys running down to coast cleared.
Most of coast to north steep and wooded. A few gently sloping areas are cultivated.
Where there are no long beaches, along shore of Gulf of Cupica. The beaches alternate with steep bluffs.

Inland from north part of gulf is dense forest with no cleared land.
Mountains to north of gulf mostly obscured by clouds.
Inland from Nabugá is a rather dissected upland with rivers meandering but deeply entrenched. Densely forested.
Below Tagachi and Arquía are several large lakes, surrounded by swamp forest.
Flood-plain of Atrato largely forested with palms - Euterpe, Manicaria, Manicillo, Mora, etc in swamp forest.
In places almost pure stands of Manicillo.
In places much open water, numerous lagoons. Atrato is very muddy, the lagoons without openings have inky black water. Some are somewhat muddy.
Manicillo has leaves white beneath some show conspicuously.
Some clearing on natural levees. Back of this - swamp.

1998 Colombia

Euterpe very abundant in swamps by river, reaching almost to Quibdó. More clearing as natural levees to Quibdo is approached.

The swamp forests have an understory principally of Cyclanthus with very large leaves sharply divided, ~~short~~ acaulescent

~~Asc. crateriformis~~ Zamia ~~Cyclanthus~~ Cyclanthus grows in slightly wet situations, trunk about 1m.

Cratieuas says the Mauritiella has pneumatophores.

Mar. 30 – Quibdo
cultivated

39377 1 Borojoa patinoi

30 m.

small tree; fruit immature, eaten mixed with milk and sugar when ripe, odor unpleasant.

with fernaldi

Mar. 30 Turuandó, on road above Quibdo toward Medellin cut-over land

39338 (fungi)
terrestrial in river ravine

39 (fungus)
attacks scale insects.

~~Mar. El Piñal de Atrato~~

Mar. 30 Bolivar Antioquia
The mountains here are completely denuded except for ravines where trees remain to shade the coffee. Bananas are planted on steep slopes, but most slopes are covered by a thin growth of Melinis, with abundant erosion scars. The soil is a pink to orange latosol.
In the valley above this several miles are plantations of Tournefortia on steep slopes.

In the valley below Bolivar a few miles above its junction with the Cauca is a rather dry forest along the river with Bursera, etc. The slopes above are

extremely eroded. The same is true of the gorge of the Cauca, but with less forest. The rivers are very muddy.

tract scaled flowers rapidly, white in bud.

Between Bolombolo and Medellin are coffee plantations alternating with bare slopes. The plantations are shaded by Inga trees from 2-5 or more m. apart, varying in height from 3 to 12 m., flat topped, forming a medium shade. The coffee is in flower at present and is all trimmed down to bushes 1-2 m. tall, mostly about 1 m., spaced variously from 1 m to 2 m. or more.

2100' (photos)
(photos shaded and eroded hills)
4100'

Large areas are completely cleared, bare hills with perhaps a few patches of tangled secondary vegetation on the steepest slopes and in heads of ravines. Very little second growth scrub, mostly pasture, this of Melinis, very thin, badly eroded, very dry at this time. Some plantations of figueira and banana that look rather poor.

1953 Colombia

Mar. 30 via Carmen de Atrato

Mar. 31 – Santa Helena, near summit of highway bet. Medellin and Rio Negro
Brushy over-grazed slopes and low thickets

3	9340	Epidendrum terrestrial
2	41	Nertera granadensis on moist banks at foot of cliffs, shaded
2	42	on moist banks in sun
2	43	Borreria common in low brush
2	44	Coccocypselum occasional on low cliff
3	45	Vaccinium occasional
1	46	(Melastom) occasional
1	47	Viola occasional
1	48	Epidendrum occasional
1	49	Viola rare

5300' (photos)

2650m. (9600') in a small ravine in an exposure of what appears to be a lateritic crust. The gravel soil appears to be a lithosolic yellow latosol, much eroded. Dr. Wagenknecht found a paucity of insects and n

– leaves fleshy distichous, flowers flesh-pink.
– prostrate, leaves somewhat crispate, flowers yellow-green, fruit vermillion, fleshy.
– witches broom on Nertera granadensis (3934)
– flowers white

prostrate, fruit
– bright blue, fleshy,
~~shrubby~~ sparsely branched erect shrub 3.5m. tall
bracts pinkish red
corollas pale shell pink,
– fruits reddish (immature)
shrub, petals rose purple.

flowers ~~pale~~ pale lavender with dark purple lines on lower petals.
– flowers pinks to purplish.

flowers pale lavender with dark lines on lower petals.

1958 Colombia

A-Bejuco

3 9950 Berberis
occasional

2 51 Bejaria
occasional

2 52 Galium hypocarpium
occasional

3 53 Vaccinium
occasional

1 54 Epidendrum
occasional, terrestial

March 30 - El Piñon de Atrato, upper Rio Atrato
Choco.
on steep brushy cut banks above road

1 55 (lil)
occasional

2 56 Rondeletia
abundant

March 31 - El Poblado, suburb of Medellin

1 57 Jatropha
cultivated as ornamental

flowers white, leaves
- bipinnate.
shrub 2 m. tall, leaves
- glaucous beneath,
flowers rose pink.
climbing in bushes,
- fruit orange, fleshy.
shrub 2 m. tall,
- bracts rose red, corolla
red with white tips.
flowers orange.

800 m.

stem unbranched 1.3 m.
- long: flower white.
shrub 1-2 m. tall:
- flowers white.

(500') Asclepias
1540 m.

rounded shrub 1.5 m.
tall, flowers crimson,
- lobed somewhat wrinkly.

April 1 - flight from Medellin to Bogotá -
Tops of hills around Medellin still have occasional patches of forest, but very little. That some are undisturbed is suggested by presence of white Cecropia. Mostly the summits and higher slopes have a thin brush, or locally, thickets. The slopes are in grass except the uppermost ones and where there are coffee plantations. East of the city are extensive bushy slopes, the ridges badly eroded. Some ravines wooded. In lower valleys patches of sugar cane.
Mountains east of Medellin brush-covered then mostly wooded.

April 3 - Bogotá - Zipaquirá by road.
The sabana is mostly in grass, small plots, with crops. The hills around it are largely covered by a scrub vegetation, with occasional slopes cleared and grassy. The hills are

all g mostly of a light yellowish bedded sandstone. At Zipaquira is a large salt dome, with pure salt in great masses and associations in a black shaly material.

1959 Colombia (Cundinamarca)

April 4. Hills s.e. of Tenjo

Scrub about 2-4 m. tall, dense, tangled except where penetrated by cattle.

The ground very mossy, the moss forming loose cushions and hummocky around bases of shrubs. Low Pteridium. A great mixture of shrubs and small trees, trunks seldom more than 3-5 cm. thick, usually less, rather rigid branches or many. Ericaceae, Melastomaceae (Miconia), Myrsine, Xyloma, Vallea, Piper, Cordia

39358		Piper
5		occasional in secondary scrub
5	59	Smilax
		occasional in secondary scrub
1	60	Bidens
		common, in secondary scrub
3	61	Miconia
		very common in secondary scrub
4	62	Myrsine ferruginea ?
		very common in secondary scrub
4	63	Myrsine ferruginea ?
		rare
5	64	Palicourea
		common in secondary scrub
5	45	Cavendishia
		occasional in secondary scrub

(8800') 2700 m.

On the middle slopes Chusquea is very abundant.

The soil is a fine black layer up to 1 m. thick but mostly eroded much thinner, lying on a pale sandstone.

At the top, on the main ridge leading down to the pass, the vegetation is a sparse scrub, the bushes mostly 1 m. or less tall. Some Espeletia corymbosa, Senecio, Hedyotis nitida and Hypericum juniperinum. Badly overgrazed by donkeys, eroded, rocky. (photos of cabins and of bushy slope)

tree-like shrub 3 m. tall, aromatic.

extensive twiner

climbing in shrubs and small trees, ray bright yellow, disk yellow.

shrub 2 m. tall, fruit immature

small tree, 3 m. tall.

semi scandent shrub 3 m. tall, flowers bright purple.

shrub 2 m. tall, bracts, flowers reddish pink

3	9364	(orchid)	sepals dull greenish, slightly gibbous, petals bronze yellow with maroon lines, column dark maroon
3		road cut at edge of scrub	leaves sub-fleshy, held up on stilt roots above ground
3	67	Rubus roadside in secondary scrub, very abundant	arching shrub, extensive flowers white flushed with pinkish
4	68	Cordia lanata H.B.K occasional in secondary scrub along road	bushy shrub ± 2.5 m. tall, flowers white.
4	69	Lepechinia salviifolia (H.B.K.) Epling common in roadside scrub	aromatic shrub 3 m. tall rather weak, calyx dark blue, corolla light blue
4	70	Cestrum common in roadside scrub	shrub 1-1.5 m tall, flowers pale green with black tips.
4	76	Muhlenbechia roadside	climbing, flowers white, fruit turning reddish, immature.
		April 4 - Top of pass between Tenjo and ~~[illegible]~~ Chia in thin overgrazed subparamo scrub on steep rocky slopes	soil black, badly eroded
4	77	Palicourea very common	compact shrub 2 m. tall, thyrse green, flowers white, ripe fruit orange.
4	73	Miconia occasional	shrub 1 m. tall, flowers white.
3	74	(umbel) common	woody at base
2	75	Mutisia salicifolia H.B.K. det Wurdack rare	1958 flowers indigo

1958 Colombia

3937 Hedyotis nitida
very common
77 Hedyotis nitida
very common

April 4 – mts. above Zipaquira toward Pacho Pacho
Partly cleared, partly brushy, some areas planted to Eucalyptus. Chusquea abundant locally, no colony at 10,000' flowering.
Summit of pass at 10,750' has an area of degraded montane rain forest on the steep northwest slope, with open scrub and grass, with some Espeletia on flattish summit.
The forest is a mixture, with Drimys most abundant, but many other small trees, maximum height about 9 m. diam 2.5 dm. trunks lichen-covered, much moss on ground. Some epiphytic orchids, many ferns.
This forest, though penetrated by paths and badly invaded by Chusquea, probably represents fairly well the

erect shrub, flowers white.
depressed shrub, flowers white.
robust.

uppermost forested zone in this region. The trees are crooked, close together, have rounded crowns

Apr. 4 – northern extension of Sabana de Bogota – land very flat, mostly in pasture, some cultivation, small parcels. Salix very common along streams, and ditches and fence-rows. Eucalyptus also very common around dwellings and in fence-rows. Datura candida (?) "bracheros" is common. One of the most abundant grasses seem to be Pennisetum clandestinum. Marshy areas and hummocky areas that must be marshy in wetter seasons are fairly frequent.
Just now there is an abnormally long and severe dry season. There has been little rain in 6 months

apr. 5 – flight from Bogota to Neiva.
Savanna west of Techo
has dark brown soil, some of
it plowed, other parts
green, some marshy spots,
some rows of Eucalyptus.
South of here the savanna is
covered by clouds. The mountains
south and somewhat west
are largely cleared but with
ridges and steep slopes
wooded, the woods with
some white Cecropia.
Lower slopes green and
with scattered trees,
some rather poorly wooded,
Toward Fusagasuga the
dissected land about ½ to ⅔
cleared and green.
Below Fusagasuga
broad alluvial fan,
truncated below, grassy
but scarcely green, partly
dissected, lower parts
badly eroded, partly covered
by savana. Steeper slopes
here cleared and bright green
some brushy, some patches
of wood. Area east of course
largely cleared but in distance
higher mountain slopes
largely wooded
Area around first village mostly
denuded, around second also.

good forest on slopes of
sharp ridge paralleling
course. Valley below perhaps
½ cleared, lower parts mostly
cleared except ravines. Southward
mostly pasture and varied
secondary brush and woods.
typical shifting agriculture
pattern. Some slopes bright
yellow green, others dull
some reddish from soil
showing through. Streams
muddy and patches of
erosion very evident, especially
on ridges. Steeper slopes and
higher ridges in distance
to east wooded. Some higher
peaks below course of tilted
bedded pinkish rock, bare
on north slope, presenting
a steep largely bare scarp
along strike parallel with
course, to the southward
splitting into a number
of scarps, very rough
country but mostly clear.
Valley to east of it largely
cleared.
Now over a very muddy
river which cuts through
the bedded ridges running
southwestward. River margins
and ravines wooded.
Otherwise country is mostly

cleared and with a rather dry aspect. thinly grassy. Very little woods left even on ridges to east. Some patches in various stages of regrowth along course. Land along course mostly very dissected.
Then higher mountains, cleared, grassy, eroded, woods in some ravines but becoming scarcer southward.
Direction more extreme southward. Slopes mostly yellow-green, bottoms of canyons mostly wooded.
Country extremely rough. Ridges tending to be eroded on tops. Southward brushy regrowth on ridges more abundant. Also erosion much more apparent. Aspect then becomes somewhat ~~high~~ drier, less and less green. Stream beds here very rocky, water not muddy. little water.
Quite dry aspect except for green patches of spare wood which more and more cover slopes and valley and ravine bottoms.
Then complicated dissection in low relief very dry area with wood in ravines. Higher

Río Cabrera Cobaro

mountains to east largely bare and rather dry. Crosses a westward flowing river coming out of mts in broad valley, with ~~flat~~ flat but terrifically eroded Magdalena plain - intricately gullied and with almost no vegetation except scattered gray bushes and patches of thin semi-deciduous wood in low spots. Painted desert landscape. Then ~~flat~~ savanna with green trees and very little grass between them, density quite variable. Then small rough land with bare ridges, patches of good wood, cacao and banana plantations along a rather large river flowing s. w. Then more badlands, gray and grotesquely dissected relief not high.
Then Río Magdalena with flat bottom lands cultivated, some terraces cultivated also. Some thorn forest, especially in ravines, now bamboo. Deciduous savanna on low relief dissected land.

1957 Colombia

flat terraces partly pastured, partly cultivated, partly in scrub or scrubby savanna
Grass fields around Neiva.
In bottom land, some rice.

April 5 - by car Neiva - Palermo & return.
Valley floor - deep gray-brown alluvial soil. pasture and cultivation
Magdalena - muddy. Lined with trees - leguminosae, mostly. Thorn
Terraces - savanna with dry grass, mostly leguminous trees & shrubs, some Cereus. Grass grazed off to root except a dry dark red kind. Low gray brush common. Open scrubby wood in ravines and dry watercourses.
Randia. Guazuma Acacia.

On remnants of a somewhat higher terrace more and large trees and taller grass. Grass varies locally.

Closer to mts. trees are more abundant, locally a woodland, trees to 4-5 m. On dissected land trees have

scrub between them.
Hills to west covered by a scrub-forest or woodland with eroded areas with scattered small bushes, red soil.
Gardens and forest in valley bottoms, also some bananas very locally.
Steeper E. slopes sparsely and with sparse scrub. Gentler slopes with scrub woodland, a few balsa trees. Woods thick in ravines. Wood becomes thicker and greener higher up to top of first dissected range.
Back of this, dissected country with bushy woodland and patches of savanna. Trees taller and closer together in valley bottoms and ravines up to 15 m.
Valley of Palermo flat and cultivated and in pasture. Scarps surrounding it very rocky. Woodland on N. facing slopes, savanna on others. Scattered trees on valley floor.
Small plantation of Teak saplings below town.

photos of Palermo Valley col. + b+w. , b+w. of woodland.
Ridge bet Palermo + Mag + hod. smashed b+w. roll + 5 on roll 3.
On Magdalena side of ridge + hod. + 4 b+w.
dissected terrace at foot of scarp 4 hod. 5 b+w. of sand and disturbed woodland on eroded alluvium.
Flat savanna on middle Terrace - 5 b+w 5 hod.
more open dry savanna on middle terrace 5 hod 8 b+w.
Magdalena R. from Neiva bridge 3-4 hod + b+w.

On the west side of the Magdalena the alluvial plain slopes gently up in a series of ill defined terraces, at least 3 in number, the upper one especially dissected into rounded hills and low mesas, the scarps generally dissected into rounded hills. The river plain itself is very flat, mostly cultivated or in grass. Along the river on each side is a fringe of trees. The river has ample water at this time and is rather muddy, but the

tributaries entering it in this area are in low water and very clear. The lower terraces are sparsely vegetated except in the shallow ravines and watercourses, where there is a "gallery scrub". The general vegetation is a sparse to dense thorn savanna, with Randia aculeata vel aff., Prosopis or Acacia, Cereus peruvianus vel aff. and a few broad-leaf trees, these all small, not over 4-5 m. at most, crooked. Irregular patches of brush are interspersed with the badly over-grazed dry grassland. Only a specie of Andropogon (?) occurring in patches and drying dark dull red has not been especially grazed. As higher ground is reached the grass seems to have suffered much less grazing and the trees are much closer together, generally flat-topped with a higher proportion of larger-leafed trees, but leaves rather coriaceous.

1958 Colombia (Huila)

Here the vegetation is not so spiny and cacti are rare a absent.

This gives way as the base of the hills is approached to a woodland of broader leafed trees, mostly, of small stature, much larger and denser in ravines and flat bottoms of small valleys, in places a well developed forest. This becomes, generally, a scrub-forest, varying to woodland, a locally scrub a grass, on the rocky range of hills east of Palermo. This range is of ~~tilted~~ ~~tilting~~ beds of sandstone. The Palermo Valley has sandstone(?) ~~and~~ bluffs on the west side and steep a medium dip slopes on the east side. The bluffs are very bare and have grassy a savanna slopes up to their bases from the flat valley floor. The dip slopes are wooded with scrub forest a woodland.

Alt. 5 - flat alluvial terrace 5 km. w. of Neiva

39378 Portulaca

x v on bare ground in overgrazed savanna

On the edges of the terrace, especially there has been very serious erosion and the scarcely altered alluvium is generally exposed. The soils of the terraces vary from yellowish gray & pink and red. The alluvium is in general a gravel a gravelly clay with pebbles and locally boulders

Neiva 500 m

prostrate, leaves fleshy, purplish brown.

Aft. 5 - by car Neiva to Hobo -
eastern slope of Cordillera Central appears rather far from road east of Rio Magdalena. Gliricidia and Erythrina common in bottom-lands.
Lowest terrace cultivated or higher parts of it dry & grass with some brush.
Escarpment of next terrace abrupt, of bedded sandstone, grass with scattered trees.
Large trees abundant along streams. Broad leafed Thrn. n. Neiva finishes low. roll 3 and took several kod. of dissected terrace with erosion remnants. Low thorn bush, nearly leafless at this time. some cacti, grass eaten to roots. Beds of sandstone gently dipping eastward. a layer of gravelly alluvium on top.
Cut by shallow clear streams. Thorn scrub and thorn savanna in valleys except gallery forest along streams.

Columnar cacti common.
Large river with woodland in its flat valley bottom.
just north of hod. - 4-5 k. w. of erosion remnants etc.
North of here begins "painted desert" terrain.
Some small streams with green vegetation, low trees. Otherwise very overgrazed deciduous thorn scrub savanna. Many cereus. Very rocky.
Along streams locally are banana patches.
Low rounded hills and small mesas. Tangled woodland in deeper valleys between hills. Grass eaten to roots on hills. Trees on hills partly deciduous. Guajacum, legumes, etc. common in ravines.
Then out on a flat treeless grassy plain, cut by some brushy dry ravines.
Alluvium here filled with boulders. Grass a bunch grass. Probably

andropogon sp. apparently not eaten by stock. The grass between bunches of this eaten to ground.

Thorn forest in ~~broader~~ broadest ravines.

approaching Tello the terrace is much more dissected. a thorn scrub is general vegetation mostly green at this time, locally nearly bare

Tello to Barranca

Large trees and bananas patches in valley bd.

Hard gravel!

Broad grassy terrace north of river valley. Mostly andropogon. some cult. patches.

Few trees except in small ravines.

Low hills to east covered by scrub forest & woodland.

Deep ravines mostly wooded, dry. some slopes bare, rocky, grassy overgrazed. eroded. Three ravines cut in deep ~~red~~ gravel

Some fields of Banana

Panicum

Panicum maximum.

Eroded hills with savanna. Broad flat valley largely cult. Gallery forest along small stream with bedrock boulders. Thorn forest in side ravines, semi-deciduous.

Mts. to east mostly bare. Steep scarps of bedded rock. Woodis & grassy slopes at base.

Some small ridges of gray mudstone. Bedded pale sandstone rubble

These ~~hot~~ hills mainly scrub-covered, some grass

A flat green valley, cult. and with large trees. Bananas. Rich pastures in bottom.

guadua

Guadua Caiba. Epiphytes.

Barranca.

Largest trees seem to be Anacardium.

Bet. Barranca and Tello, n. of grassy plains. a bad finishing rd K-3 of grazed slopes, wooded ravine. about 3 km of this area. scrub forest, grazed slopes, etc.

This is area of deeply dissected

red a yellowish alluvium.
just south a grassy plain
first several frames on
Kod roll 4, about 10 b+w.

Cacao
Cacao near Tello, with
bananas, shaded by
Erythrina. On flat
alluvium along stream.
Ceibas with bottle-shaped
trunks.
Much Randia in thorn
scrub s. of Tello. Scrub
uneven 1-2.5 m. tall, open
to dense. Soils orange red,
gravelly.
South of here very rocky.
Grassy plain s. of Tello
much less rocky than that
north. Fine gray silty to
soil with some cobbles and
pebbles. Ravine with an
abundance of large
boulders, washed out of
lower layers.
A number of bradachrons
and b+w. of erecti, etc. at
s. edge of grassy plain.
also of eroded land to south.
B+w. from moving car at
Cucuna - erosion remnants.

The valley of the
Magdalena northeast
of Neiva is more complex
than to the west. The
flat along the river is
and made up of
slightly different
. This is mostly
rated a ins pastures
ere is some thorny
and rocky
nna.
next level is a
sloping rocky
apparently cut
maintenace
reams, a number
hich flow westward
to the Magdalena.
main terrace
about 2000' and
med by a white
d sedimentary
ation that dips
gently eastward.
scarp is rather
t the different
resist erosion
ently and a
number of grotesque
erosion remnants
occur along with
rounded hills formed by
a thick deposit of gravelly

Defensa de los suelos

Los colombianos, como lo ha señalado el eminente botánico F. R. Fosberg, quien se propone estudiar la degradación de la flora espontánea en nuestro territorio, hemos dilapidado todas las posibilidades de desarrollo de los recursos naturales. No hemos tenido, hasta el momento, sentido alguno de su conservación y de su incremento, como si en nada nos preocuparan las necesidades futuras del crecimiento nacional. Y como si no nos interesaran, además, los perjuicios de todo orden derivados de la pérdida, cada vez más creciente, de los recursos actuales.

El índice más grave de esa dilapidación es el abandono poco menos que absoluto en que se halla el suelo colombiano. La despoblación forestal practicada sin tasa ni medida, y desde luego sin sujeción a ninguna norma técnica, no sólo ha hecho imposible la rehabilitación indispensable de las reservas y de los recursos forestales, sino que ha dejado a los suelos expuestos a todos los factores determinantes de la erosión. Las tierras aptas para la agricultura, en estas condiciones, se han debilitado y empobrecido sistemáticamente.

Se trata, en verdad, de una bárbara empresa contra la agricultura, en particular, y contra la economía del país, en general, tanto más abrumadora si se considera que se la ha practicado tradicionalmente, sin que los planes científicos para defensa de los suelos ni los programas de instrucción a los amigos de las quemas y talas hayan surtido efecto positivo alguno. En los términos científicos citados por el doctor Fosberg, ese inclemente fenómeno es lo que ha ocasionado una degradación progresiva de la llamada flora espontánea, con la consiguiente destrucción de suelos aptos y su inhabilitación permanente para fines agrícolas.

red a yellowish alluvium.
Just south a grassy plain
first several frames on
Kod roll 4 [illegible] w.

Cacao
Cocoa [illegible]
bananas.
Erythrin
alluvium
Ceibas
tumbs.
Much R
sand s.
uneven
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gravelly.
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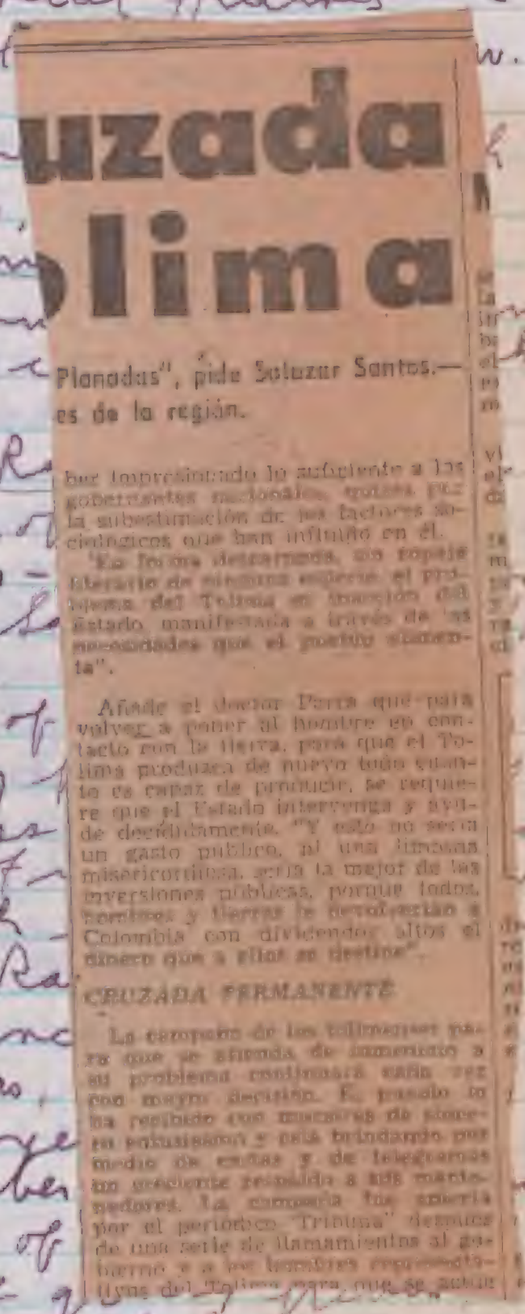
Cuerna - erosion remnants.



uzada
lima

Planadas", pide Solazar Santos.—
es de la región.

ber impresionado lo sufriente a las gobernantes nacionales, quizás por la subestimación de los factores sicológicos que han influido en él.

"En forma desarrollada, sin ropaje literario de ninguna especie, el problema del Tolima en función del Estado, manifestado a través de 'as necesidades que el pueblo elemental".

Añade el doctor Parra que para volver a poner al hombre en contacto con la tierra, para que el Tolima produzca de nuevo todo cuanto es capaz de producir, se requiere que el Estado intervenga y ayude decididamente. "Y esto no sería un gasto público, al que jamosas misericordiosa, sería la mejor de las inversiones públicas, porque todos, hombres y tierras le devolverían a Colombia con dividendos ulios el dinero que a ellos se destine".

CRUZADA PERMANENTE

La campaña de los tolimenses para que se atienda de inmediato a su problema continuará esta vez con mayor decisión. El pueblo ha recibido con muestras de sincero entusiasmo y está brindando por medio de cartas y de telegramas un creciente respaldo a sus mantenedores. La campaña fue abierta por el periódico "Tribuna" mediante una serie de llamamientos al gobierno y a los hombres representativos del Tolima para que se unan

The valley of the Magdalena northeast of Neiva is more complex than to the west. The flat along the river is wide and made up of two & slightly different levels. This is mostly cultivated & in pastures but there is some thorny brush and rocky savanna.

The next level is a broad sloping rocky plain apparently cut in the main terrace by streams, a number of which flow westward to enter the Magdalena.

The main terrace is at about 2000' and is formed by a white bedded sedimentary formation that dips very gently eastward. The scarp is rather abrupt. The different beds resist erosion differently and a large number of gorgeous erosion remnants occur along with rounded hills formed by a thick deposit of gravelly

red a yellowish alluvium.

Just south on grassy plain first several frames on Kod roll 4, about 10 b+w.

Cacao

Cacao near Tello, with bananas, shaded by Erythrina. On flat alluvium along stream.

Ceibas with bottle-shaped trunks.

Much Randia in thorn scrub s. of Tello. Scrub uneven 1-2½ m. tall, open to dense. Soils orange red, gravelly.

South of here very rocky.

Grassy plain s. of Tello much less rocky than that north. Fine gray silty clay soil with some cobbles and pebbles. Ravine with an abundance of large boulders, washed out of lower layers.

Ca number of kodachromes and b+w. of cacti, etc. at s. edge of grassy plain also of eroded land to south.

B+w. from moving car at Cucova - erosion remnants.

The valley of the Magdalena northeast of Neiva is more complex than to the west. The flat along the river is wide and made up of two & slightly different levels. This is mostly cultivated & in pastures but there is some thorny brush and rocky savanna.

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alluvium on top of the bedded material.
This terrace, where intact is covered by grassland with locally some small trees, the grass being an andropogon with a smaller grass. The latter is grazed, the former not. Locally there is a low pine scrub, dry at this time of the year. On rocky places there are tall Cereus of several kinds. Wherever there is any dissection a thorn scrub & thorn woodland appears. In the deeper ~~ca~~ and wider valleys & ravines a more luxuriant green gallery forest is found with cultivation, such as bananas.

West of Tello the alluvium becomes very thick, the sandstone having dipped so that it no longer is exposed. Here, also, where the surface is preserved there is a similar grassland & that lower down. The surface is

~~so~~ very rocky. Where there is woody vegetation it is denser forming a woodland or scrub forest, becoming less thorny, in general, as higher levels are reached. Areas of grass and ~~scrub~~ savanna are common. Everything is very much overgrazed.
The large river valleys are densely wooded with large trees, mostly cleared or planted to cacao under large Erythrina trees. Bananas and deep grass such as guinea grass, common. Northeastward toward Barranca these valleys are deeper, as the layer of alluvium is much thicker near the ~~ca~~ base of the Cordillera. The foothills are mostly covered by a rather dense scrub forest, probably evergreen, at least very green at this time. Some areas here are grassy & with scattered brush and trees.

1958 Colombia (Huila)

April 6 - outskirts of Neiva in dry weedy alluvial flat

3 39379 Commeliina
wet spot near irrigation ditch

4 80 Guazuma ulmifolia
common

4 81 sub.
common in fence rows

4 82 sub
common in fence rows

2 83 Tournefortia
common along road.

4 84 Cordia globosa (Jacq) H.B.K.
common along road

4 85 Momordica charantia
common along road in fence rows

2 86 (Asclep.)
occasional in fence row

4 87 (Cordia)
common in fence rows

4 88 Casearia
common in fence rows

2 89 (menisp.)
common in fence rows

3 90 Passiflora foetida
roadside weed

(Huila (Laguna))

Aps. 4 Puerto Leguizamo, on Rio Putumayo

3 91 (gram)
common around air field

472 (cont'd)

prostrate; 2 large petals blue, one small one white.

small scraggly tree 4 m. tall, fls. dull yellowish.

semi-scandent scrambling shrub 2.5 m. tall, spinescent branchlets; corollas white.

scandent shrub, corollas white.

flowers greenish.

semi-scandent shrub.

subpubescent herb. 0.7 m. tall, flowers greenish white.

vine, climbing on bushes, flowers yellow, fruit orange.

lactiferous vine, flowers white.

scandent shrub; flowers yellow.

small tree 5 m. tall, fruit red-brown.

vine climbing in trees. flowers greenish.

vine flowers white corona purple within; fruit green

Rio Putumayo

culms ascending

April 6 – Flight from Neiva to Florencia

Some fair sized patches of forest left on high slopes of Cordillera Central visible from Neiva.

Some irrigated land near Neiva, but very little. Banana patches look dry.

Low eroded terrace west of river has very sparse bushy vegetation except in shallow ravines, where there is continuous small scrub.

Some areas completely grassy and with no bushes (photo)

Dissected higher land south of Palermo very bare and dry except lower slopes which have low woodland or scrub and canyon bottoms which have woods.

East of Magdalena R. east of Retiro is a large area of parallel low strike ridges, badly eroded, with woody vegetation between them. This crosses river to west near Hobo and continues south westward. West of this a large area of grass.

Hills south of Iquira are grassy with wooded ravine

heads.

Some small wooded areas in meanders of Rio Magdalena.

Valleys entering from east are wooded in their bottoms, as also their tributaries and ravines running up from these. Mts. otherwise grassy

Entire upper valley seems to be grassy except for ravines and strips along streams

North of Gigante large grassy plains. Around Gigante some fair patches of forest on flat land, esp. to south.

Very little wood visible on Cord. Central perhaps 10%, or less.

On Cord. Oriental under course some good patches on upper slopes. To east much forest.

Some dense woods along Magdalena river bottom below Garzon and on affluent below Paital

East of Garzon many small patches of wood esp. palms in lower hills. Thick montane rain forest with scattered white

Cecropia over almost all of higher mountains east of Gigante.
Landslide scars occasional ~~slopes ab~~ A few clearings on e. slope along course just after crossing, but very few.
Entire area visible s. and w. of course densely and evenly wooded. To e. east wooded also but some clearings.
Many palms in this forest. A few small clearings along stream perhaps ~~N.E.~~ S. here.
Approaching Florencia lower slopes have many clearings, possibly 1/3 of area in valleys. Some grassy, some in various stages of regrowth.
photo. Lower down perhaps 2/3 cleared. Flat land at foot of mts. for several miles around Florencia mostly cleared.
Caraguaya Rio ~~Caraguaya~~ extremely meandering below Florencia. Manicita grove and Guadua conspicuous.
Grass around Florencia very poor - around airport

mostly Paspalum sp. aff. dilatata and Panicum maximum. Soil rather red. Some palms left in clearings.
(Begin roll b+w. + here with Guadua patch at distance)
10.27 Left Florencia
Clearings extend down Rio Orteguaza and for 1-2 km. on either side, in grass but some weedy + scrubby regrowth.
River muddy. Some ox-bows.
10.3. Much clearing to about Potosi (?), scattered clearings from there and a narrow strip along river, much active clearing and burning going on.
10.40 Large inundated area west of river, extends down somewhat.
Forest with fairly dense canopy, many palms to canopy, many emergents + some bare, many in young foliage.
11.15 6 photos
Considerable cumulus cloud.
Rio Caqueta visible in distance to west.
A few clearings as we

Tres Esquinas

approach Tres Esquinas, much swamp with dark water east of Rio Ortegueja just above Tres Esquinas. Many palms.

11:13 Tres Esquinas. Situated on slightly higher ground.

12:12 Left Tres Esquinas
Some clearing on slightly elevated ground around Tres Esquinas (2 photos)
Many palms in forest.
Some inundated land very near Rio Caqueta on east side, but not much.
Scattered clearing for a short distance down river.

17:14 Rio Caqueta bends east to cross
"2:0 again. Crossed it. Very muddy.
The forest here is low, in places inundated, crossed by channels or streams that meander through it.

12:7 Crossed river again. A few scattered small clearings along it.

12:13 Swampy area west of river. (Lake on map.)

12:16 Crossed river. Inundated area east of it. Clearing on low bank which is higher.

12:17 (photo of forest)
Forest away from river rather uniform but apparently tree compo-

sition varies. Occasional pink flowered emergent tree, a few bare ones.

12:19 An elongate area of tangled low vegetation that looks like a wind-thrown strip, partly regrown. Palms still common but less so than before.

12:24 Pink emergents more common.

12:22 Rio Caqueta far in distance to east.
Bare emergents more common. Some with white flowers, narrow crowns.

12:23 Tree and light pink ones now very common, probably same thing. (2 photos)

12:25 a lavender-flowered emergent occasional here & there stands of a palm. Clearings.

12:26 Appr. Puerto Leguizamo.
Matting strip, not long. Clearing.
Large cleared area around town and air strip. Small village, mostly military post (3 photos town, 2 bird, from air strip)
Rained most of time we were on ground.
Tall forest in sight from airstrip in all directions.
Sky mostly cloudy. Temperature high, humidity high, little breeze.

April 6 Flight Puerto Leguizamo to Florencia to Bogota.

1:12 Left Pto. Leguizamo runway.
Groves of Mauritia along air strip at south end. Soil on higher ground red. A road leads northeastward some clearings along it. Apparently goes to Rio Caqueta. which can be seen in distance to east.

1:16 Pink emergent trees common
1:17 in forest.
1:17 R. Putumayo visible in distance to west, Caqueta to east.

1:20 Passed over what appears to be some old clearings. Otherwise uniform lowland forest. Abundant big cumulus clouds.

1:27 Rio Caqueta bends closer on east side.
A few yellow flowering emergent trees many light green newly leafed out ones.

1:28 Course reaches bend in river enclosing lagoon a swamp (of 1:16) small

1:35 Rio ~~Caqueta~~ Esqueras
Much swamp on all sides.

1:39 Swamp with palms.

1:42 Clearing on higher ground, some swamp close to river. Left river to left side.

1:45 River well to left. Some slight relief here, maze of ravines cut in terrace, heavily wooded. a light green flat topped emergent common occasional.

1:50 Foothills area (photos)
1:55 arrived Florencia

Between Puerto Leguizamo and beginning of cleared area below Florencia took remainder of this roll 5 and a number of kodachromes. Light for some rather poor.

2:24 Left Florencia
Many palms in forest on foothills above Florencia.

2:27 Scattered clearings well up into hills. Some planted to bananas. Then none for a few. Water in streams in canyons here clear and dark, not a trace of mud.

2:30 Some clearings in deeper valleys, but few.

2:32 Palms less abundant but still common.

2:33 Traces of old clearings, some new ones, perhaps 25% cleared in a broad valley.

2:34 Patches of very light green trees on tops of certain peaks and ridges.

2:34 Still considerable clearing in wide valley.
2:38 Still same.
Many pale yellow-green trees in forest, some white Cecropia.
2:37 Clearings strung along a mule trail up into mountains.
2:38 No more clearings. White cecropia common in ravine. Vegetation on crests much lower and finer texture than on slopes.
2:39 Many clearings. White Cecropia very abundant.
2:40 Crossed a valley that is perhaps 1/3-3/4 cleared, this on west slope. Lower west slope 75% cleared. Some steeper slopes and ravines left. Higher slopes and ridges mostly intact.
2:42 Road running up a ridge to a farm well up.
Most of farms connected only by mule trails.
2:44 Passed to east of Guayabal. Here clearing is perhaps 25% on outer ridges or east orientd. Inner ones still forested.
Trails mostly on ridges. Slopes show signs of over-grazing.
2:46 Mts. here almost entirely cleared

grass rather thin and tending to be dry. Considerable erosion.
2:47 Dry low hills, grassy but very overgrazed, woods in ravine.
2:48 Broad valley of river from Algeciras, much irrigated ~~and~~ rice, much pasture above and below Campoalegre. Terraces dry, gullied.
2:50 Mts cleared 2/3 the way to tops in distance.
2:51 Extensive terraces with some cultivation, some savanna, ravine wooded some open grass fields.
2:52 Narrow gallery forest along Rio Magdalena.
2:54 Terraces & east mostly thorn savanna. Some rice along river.
2:55 Neiva.
Many trees in city.

Dry area in Magdalena Valley extends at least to above Garzon.
3:01 Left Neiva.
Some rice along river, but savanna and eroded hills come practically to river on east side
3:25 above Neiva. Tierradentro.

Where old surface of terrace is preserved there are no trees, only grass. Ravines have trees. Slopes either savanna or woodland.

3:20 Opposite Baraya — some areas covered by thin forest, some eroded bare. Eroded flat areas extend nearly almost to Cabrera then barely eroded hills from there north, woody vegetation only in ravine bottoms.

Mts. west of Cabrera Valley are almost completely denuded except for bushy vegetation in canyon and ravine bottoms. Ridges badly eroded.

3:39 Hills become slightly greener. Tops still badly eroded, woody vegetation only in ravine bottoms.

3:42 Some flat country, mostly thin grass, trees along streams that come out of mts. Some of it very badly eroded, esp. just south

3:43 of Prado.

River n. of Prado meandering, dark chocolate color.

Valley rather green, very little woody vegetation.

3:44 Upper part of valley greener, grassy. Hills here thinly grassy.

3:45 Visibility low.

3:48 Country dissected, much greener, some woods, mostly in valleys and ravines.

3:50 Strike ridges parallel to course, about 130° & fairly wooded.

Northward now

3:52 Cunday Cunday - Flat grassy valley with scattered trees sharp bare grassy ridge parallel with course, ~~flat~~ ~~grassy~~ gently sloping grassy country with scattered trees on both sides of it, patches of woods.

3:54 Head of valley above Cunday and of other valleys nearby considerably wooded but with many farms probably much coffee. Lower slopes largely grassy.

3:56 Sharp ridge curves westward and crosses course.

Icononzo. Icononzo

3:57 Pandi. Pandi

Grassy slopes, much cut by ~~frost~~ first frost

3:58 San Bernardo in distance much forest around it. Nearer slopes largely cleared with thin second growth.

1957 Colombia

4:01 Hills in distance with thin broken woods, pst. coffee plantations, much pasture. Below Tuluagangá a long sloping grassy terrace. Many patches of woods n. w. of Tuluagangá. Some grassy slopes.

4:02 Coffee and pasture mosaic.

4:03 Grassy slopes with many scattered trees left from original forest.
Higher slopes in part still densely wooded, mostly cleared.
Many farms throughout this area.

4:04 a large patch of excellent forest on west slope of rim of Labava.

4:05 Large lake or reservoir at lower end of Labava
Factories above it.
Green fields, now have on
4:07 Town.
Hills badly burned over little vegetation except thin scrub.
Plowed fields, white, round
4:08 Techo. Rows of Eucalyptus.
Fields W. of Techo very green.
Many Eucalyptus now.

1957 Colombia

Barranca Bermeja

April 9 - flight Bogotá to Barrancabermeja

Plowed fields & earth in Labava are much blacker than in the southern part.
Hills at north end & west of course have about ⅓ of forest left, in places less.
North, over the hills, in the drainage running down to the Magdalena the hills are cleared but have small patches of wood left in the ravines. The ridges tend to be eroded. The principal new feature trails, which tend to initiate erosion. Many farms - the density of houses here is very great and few of them are connected by roads, mostly by trails.
The general aspect is green with dark reddish eroded ways.
Northward the pattern is more & less the same, but farms become fewer.
Visibility very poor. Abundant cumulus clouds.

Mineral (D) Valley of Río Minero becomes more and more cleared northward. Some ridges seem to have remnants of original forest. Some ravines have woods. Most slopes grassy or recently burned.

The main escarpment descending to the Magdalena is still largely wooded, at least on its lower slopes and from here the woods become rather continuous
Rio Grande? Rio Cesar? Rio Ranchería? Rio Limón?
(probably very poor.
Wherever a bit of the earth shows it has dense forest, few clearings but some rather large ones, especially west of Lower Rio Carare. Rio Carare very muddy. Road running east from Limitara. Much clearing. Below this are clearing along banks, but not many areas from river.
Lower Rio Opon Open areas of slightly elevated land are cleared. Low swampy area along river Opon also.
Low hills around lake and between R. Opon and Bajo Berm cleared or being cleared. Already eroding in spots.
Mostly cleared land between R. Opon lake and Bajo Berm. Wherever it is hilly is badly eroded. Less so immediately south of B. B. Ridge tops are sites of active erosion. Much secondary

vegetation dec, especially in ravines.
This is a low dissected terrace of very rec alluvium, pebbles abundant. The tops of the remnants of the terrace are mostly cleared and grassy in the immediate vicinity of Barranca Bermeja, some guava trees. The ravines generally have guava scrub but are swampy, some with mixed wood, some pure Cativo, others open and grassy.

Over Rio Blanco to a compound Cleomaceous pod with small apparently quite dry islets, white sand showing in sandy vegetation in interior of island. Mostly seem to be planted to coconuts which do not look too flourishing.
The coast of the Isthmus here is a typical drowned coast. The peninsula that shoots south toward the island has a fringing reef on its outer side, a barrier reef around its point and no reef at all on the bay side.

Apid 9 – flight from Barrancabermeja
in small plane.
Part of terrace is skeletonized
into narrow ridges.
Many oil wells on this
terrace s.e. of B.B.
a large part of the terrace
in the general vicinity to s.e.
is cleared but less and
less as we leave B.B.
Part of cleared area is
growing back to Cecropia
and other trees. Much is
~~(transformation)~~
being cleared or has recently
been
1.46 Within 5 minutes the clearing
has largely been left behind.
Flying about 300' the forest
appears very mixed, many
light green, a few completely
1.49 bare at this time.
Ascending Rio Fagamoso.
1.53 Some clearings, scattered,
in various stage of regrowth.
Hilly land. Clearings often
on slopes show zonation.
Rio Fagamoso is wide and
braided.
2.56 Ends completely cleared
country rather abruptly
at confluence with Fagamoso.
Rivers have extensive
gravel bars & Terraces

with scattered trees. Patches
on slopes, mostly grass,
slopes and ridges hilly
considerable rock showing.
Ridges, especially, ended
slopes here very steep.
3.00 Tunnel went down river of Aguas
Most of slopes slopes
have abundant boulders
showing, even underlain
in grass. There are still
some patches of forest, but
clearing is going on. Perhaps
70% is cleared.

3.10 A large area of moderate
relief, with patches of
woody vegetation in deeper
places and ravines, the
soil completely removed
from ridges and higher spots
leaving pinkish to reddish
scars. (Around Lebrija)
4.10 ~~Down river is very~~
~~cut by streams~~ A much
greener area much of it in
banana, some patches
of woods, little enough but
shows much but cleared
slopes have abundant
boulders showing. Trails
and roads tend to be on
tops of ridges, and scars
initiated. Clay. Soil in
general reddish but lighter

where badly eroded.
More and more woods
as we go back toward Rio
Magdalena toward west.
Erosion of serious proportions
seems to initiate and proceed
very rapidly here after
clearing.
7:13 Mostly forest, few clearings
7:16 & road, lined on both sides
by clearings. Then the
railroad to Puerto Wilches. Puerto Wilches
Then mud forest
and little clearing for
a while, then badly
cleared strips
Course about northwest.
Each clearing
some slightly hilly section
badly eroded.
7:23 Open line of new railroad.
Thick forest left here
but clearing is started
on fairly large scale.
Forest here with many
emergent trees, tall, canopy
appears rather open.
7:26 Approaching Lake n.e. of Puerto
Rio Magdalena - dense tall
forest - many of emergents
are bare. Which inundated
land on east side of river.
Water in numerous lakes
& bays. Open islands of probably

floating vegetation. Ox-bows
and channels. Inundated
land separates from river
proper by several km. of
wooded slightly higher
ground, mostly cleared east of Barcadel
Rosario. Above this especially,
the river is broad and
much braided, with
extensive sand bars and
sandy channels.
Puerto Wilches
Small lakes some miles west of
River. Some forest and
some low wet grassland,
muddy channels and
ponds. Some apparently
sandy ground, clear or
almost clear of forest.
What may be some natural
grasslands - outlines of
patches very irregular -
South of Simiti.
Land here has a rather
karst-like aspect. Small
hills just south of lake
some grassy, some wooded
with many bare rocks
many bright yellow
tabebuias. Latter of which
appears to be deciduous
forest and bare places
on these hills. Considerable
savanna. Land around

limit apparently subject to seiour burning and grazing. Hills & west largely denuded and very overgrazed and eroded in cleared parts. Cattle trails form a fine network in cleared parts.

Westward largely forested but some hilltops bare. Then mostly forest with occasional clearing as mountain are ascended to west. Then turned and went back to east because of weather, then northward west of Cabo de Limiti.

This area seems, judging from proportion of deciduous trees, to be rather marginal climatically, and the savanna patches tend to bear this out. Large areas in hilly part are savanna and locally very badly eroded. The forest on hills north of Cabo de Limiti seems at least half bare of leaves. Many very large bright light green trees.

North of this much

land that appears to be seasonally inundated, with areas of higher ground cleared & almost as much of it apparently savanna some recently burned. Some of this rather abruptly higher than river channels & also has a swamp or marsh but there is a large proportion of high ground-which is definitely seasonally deciduous forest, much of this apparently subject to burning.

Bay east of Brazo Papayo and Brazo Limiti.

Northward much seasonally inundated land around Cienega de Morales, much somewhat high ground, esp. around Morales. Land to west ~~was~~ is hilly and wooded. Cienega de Morales is at this season a great series of channels with strips of dry ground and dry ponds. Muddy.

Toward Rio Magdalena is much less high ground and most of it must be

seasonally inundated.
Innumerable ponds.
Some patches of forest
Apparently a natural
levee ~~of~~ west of Rio
Magdalena, or perhaps
Terrace slightly above
high water, as that on
which Gamarra is
situated across the river
Down river more or less
the same sort of country
~~not~~ mostly subject to
flooding much open
somewhat grassy or
just muddy land,
patches of wood,
patches of savanna.
Many lakes and
ponds. Much more water
than appears on map.
(Large lake n.e. of Gamarra
not located).
Forest on islands w of
Rio Magdalena appears
greener than around Simiti
and Gamarra.
Approaching La Gloria
most of land is grassy
and very green, scalled
bits of wood, no high
ground here on islands.
Large areas of grassland
east of river as far as

we could see (visibility
rather poor)
Road from La Gloria to
Aguachicha.
Islands grassy toward
River, wooded westward
but with much clearing.
More wooded westward.
Lake north of La Gloria
is really a great series
of small lakes and ponds
at this season.
Large sand bars in river
Island more wooded
northward but still
mostly cleared.
North of lake much
grassland, extending
to and beyond Tamalameque.
Hundreds of ponds in
island west of river
much grass, some woods
Many of trees bare
Much evidence of burning
everywhere.
Patches of forest toward
river on east side north
of Tamalameque, much
savanna, some clearing
and burning going on.
Northward toward
Cienaga de Zapatosa
hundreds of ponds
east as well as west of

river, land mostly grassy, some patches of woods, trees along boundaries between pastures, some scattered in grassland.
Area S. and W. of Cienega is mostly grassy and certainly seasonally flooded. Gallery forest along channels, probably on natural levees. Many cattle on grassland.
Great difference in appearance of grassland with very slight difference in elevation. Some patches of thick woods or islands, but more grassy than wooded. Considerable woods on west side of Cienega. Northward to Cienega, the islands have some elevation, largely denuded, but some still wooded. Woods here semi-deciduous. Many palms. This whole area is extensively burned every year.
Around Chimichagua mostly cleared.
East of Chimichagua the lake bed is an intricate labyrinth of channels, pond

and natural levees, the highest of these wooded - northeastern over high ground, but hundreds of kms, the land varying from grass & savanna to woodland & scrub forest to patches of tall semi-deciduous forest, but there mostly being cut. The woody vegetation is mostly scrub & scrub forest, some rather dense & tall forest rather open. Northeastward much less water, more grass, burned area is even further. Much of this probably flooded seasonally, some areas probably not.
Toward Chimiguaca savanna-marshland more of area, less flooded land. Northeast of it are vast areas of savanna, gradually replaced toward foot of mountains by forest. Angular outlines of these patches of woods suggests that the savanna is of rather recent human origin.
3:45 Landed at small dirt strip at Chimiguaca.

1957 Colombia

Apr 9 Chiriguana

cult. plants seen
Gliricidia sepium
Bahuinia purpurea
Jatropha urens
Euphorbia tirucalli
Cocos nucifera

Savanna east of town
thin grass with
scattered small bushy
trees 4-7½ m apart,
very thin grass,
patches of small trees
up to 4-5 m. tall mostly
Byrsonima crassifolia
and Curatella americana
Badly overgrazed. Many termite nests.
Tabebuia Barbasco
Tabebuia - strip of
gallery forest
in the savanna
with large Ceiba
tall palms of at
least two kinds
one or two large leguminous
trees Crescentia etc.
Thinning open & closed
forest with thick
undergrowth of
Xanthoxylum, a common
subarboreal shrub Annona
Randia, Mimosa and
other vines and
very prickly young
Tripsacum Euphorbia
especially around
edges.
Ground wet but
mostly not any
standing water. Much
water borne debris - shows
that in other seasons there is
standing water.

1948 Colombia

April 9 – Baraguna, about 15 km. e. of Chiriquana

small patch of thick low wet woods

3	9392		flowers white
5			
3	93	Lapium	laciferous tree,
3	94	Psidium guineense	shrub. flowers white.
"	95	Faramea ?	"graybi"
		very common in undergrowth	shrub 3 m. tall,
4	96	(Rubiac.)	fruits dry, black,
		rare	shrub 1 m. tall; flowers
3	97	Faramea	scarlet.
		common in undergrowth	shrub 2 m. tall;
4	98	(Annonac.)	fruit black.
		rare in undergrowth	slender small tree,
4	99	Randia	bud green
		~~occasional~~ occasional in margins of thicket	shrub 4 m. tall, ~~flow~~
3	9400	Randia	fruit immature
4		~~occasional~~ occasional in margins of thickets	flowers white shrub 2 m. tall
4	01	Vitex cymosa Bert. ex Spreng.	tree 10 m. tall; ripe fruit
		occasional	black, fleshy, eaten
			fruit of very fine taste
			"acaturo"
5	02	Ilex ?	tree 8 m. tall, flowers
		occasional	white.
3	03	~~Rubiaceae~~ (Rubiac.)	
3	04	(Rubiac.)	flowers white

1953 Colombia (Magdalena)

April 9 - Blvd of Chiriguana
in open dry savanna

39403		Mimosa? occasional	
4	06	Byrsonima crassifolia common shrub	shrub 1.5 m. tall, buds white.
			shrub 8 m. tall, petals bright yellow. wood used for firewood, "peralejo hembra"
9	07	Pouribea occasional	shrub 3 m. tall, buds greenish; fruits fleshy, black when ripe
2	08	(rub.) very common	shrub 2 m. tall, fruit green.
5	09	Coutarea americana very common	small tree "peralejo macho" wood said to be useless for firewood as it breaks pots.
3	10	(Bign.) Cydista aequinoctialis (L.) Miers det. A. Gentry 1974 occasional	scandent shrub climbing in bushes, flowers pale pink.
1	11	Serjania occasional	
1	12	(rub.) common	shrub 2 m. tall, fruit black, fleshy.

1958 Colombia

April 10 - From Chiriguana
Savanna with gallery
forest along shallow
watercourses
To northwest - about 2 km. to
seasonally flooded land
semi open forest with
palms, many Tabebuias with
yellow flowers, around
edges of unsuitable land.
This is almost completely
dry now except for a few
small ponds and a small
lake. Much of it has been
burned; is a mosaic of
patches of deciduous &
semi-deciduous forest,
open grass, meandering
wooded channels, mostly dry,
ponds, patches of savanna.
Ponds have, in places, green
floating vegetation. Through
this meanders the Río Cesar, very
muddy, little or no current,
surface somewhat below banks.
West of this is a mosaic
of deciduous forest and
savanna, very much busier
than savanna but clearing
and burning going on very
noticeably. Palms abundant
in this forest. The larger trees
are mostly bare, some
newly leafed out, lower

story green, much more
continuous than upper
but locally quite open,
locally dense. Back towards
Chiriguana this is
more and more cleared,
in places as much as 75%
open. Burning has
killed the palms in place.
Every stage in development of savanna represented
here. Farther back good
forest is almost absent,
but gallery forest along
watercourses and degraded
patches are common, as
well as patches of scrub,
but mostly grassland
and savanna. Palms are
frequently left in clearing.
Around Lake Zapatosa is
a woodland-thicket
complex, with bare shores
& with very thin grass. Even
the islands in the lake
have been mostly burned
where there is land high
enough to have anything
to burn. In lake are winding
channels bordered by
natural levees, forming, at
this season, long winding
islands consisting of two
parallel strips of low land.

1958 Colombia

A few of larger islands in lake are well-wooded but badly burned. Islands appear sandy, from air. Those toward southeast side of lake wooded if long, but woods are very scrubby and badly burned, in places changed to savanna.

Zapatoza

From Lago de Zapatoza passed Natillo - park-land, very badly eroded in immediate vicinity of town. Beyond, in direction of Ocaña a mosaic of grassland and forest, the forest being cut and burned very rapidly, the grassland locally eroded, locally being converted to ~~Savanna~~. Gallery forest and dense patches apparently marking low wet spots. Crossed line of new railroad under construction. Similar mosaic continues with slight elevation and dissection resulting in local serious erosion. Forest mostly gone here.

Farther on as first ridges of foothills of Cordillera is much more forest but partly very badly degraded. Saw here north, parallel with railroad route, a mosaic of clearings, forest, and second-growth.

Ayacucho

South of Ayacucho is mostly grassland with some broad strips of forest and scrub. Much more grassland than forest. Southward much of the grassland is gone back to scrub and most of the forest is being cleared. Big stream-beds meander across this toward the Rio Magdalena. Mosaic of grass, scrub, forest and recent clearing more sharply marked southward.

just north of Aguachica

Approaching the mountain the dissection is much greater, in a somewhat radiating arrangement of ridges and valleys. This somewhat more wooded, but largely cleared or in secondary scrub. Eastward, toward Ocaña the country is rougher and more wooded. Pass is through mostly cleared and grown back to secondary vegetation. High mountain west and northwest of Ocaña very largely denuded, but with considerable woods locally in steeper ravines. The usual trade

on tops of ridges farms in apparently impossible spots. Highway to Ocaña winds along steep canyon walls. Locally some erosion and landslide scars.

Valley of Ocaña with lower but complicated relief is strikingly eroded. Also much erosion on east slope of mountains. The valley bottom, much dissected, has some trees and thicket in ravine bottoms. Patches of cultivation on flat places, but in most places a fine mixture of exposed bedrock - red shales to white, and ~~trees, and a shrub~~ "tree" scrub ~~herbaceous vegetation~~ on thin grass. Gullying is intricate and deep. The surrounding hills seem to be covered by ~~scrub~~ a very dark dull green, "tree" scrub rather than grass.

The streams are in very low water, but the water is very clear.

Some sugar cane and plantains in cultivated spots. Perhaps 1-2% of land cultivated.

The soil is fine and pale gray a yellowish gray. Weathering is deep and subsoil changes downward from red to white. The

reddish part is a finely mottled clay with some coarse sand and fine gravel, occasional pebbles.

The grass is a bunchy dark gray-green puberent type sterile at this season. Vegetation less uniform than tops of surrounding hills except for eroded spots. Essentially no forest except thickets in ravine bottoms.

The soil has in general lost its A horizon and probably most of the B. In a few protected spots there is a brownish gray layer up to 3 dm thick, which indicates that there was once a fairly good soil here. Weathering from 2-5 m.

On many of the hills an extreme grazing pattern is evident. There are many goats and donkeys and immediately around the town the slopes are a mass of gullies. 10:55

Left Ocaña on trail at 10:55 for Tamalameque NW.

On high ridges west of Ocaña are some scraps of montane forest left, much degraded, but with a few

1959 Colombia

white Cecropias left. Some patches also in steepest ravine heads, but mostly these hills are bare to their tops.

Alluvial slopes at west base of mountains have forest in ravines and a mosaic of forest, scrub and clearing between the ravines.

~~The line of the railroad [illegible] is visible [illegible] river channels shown on the map.~~

Visibility poor because of dense haze.

Strips of forest extending from the foot of the mts toward the Rio Magdalena in the region of Ayacucho - La Gloria apparently represent stream bottom-lands. / Northward in the region of Costilla these seem to be badly degraded and largely changed to scrub and savanna except for the immediate banks of the streams themselves, which may retain a narrow strip of trees.

North of this the gentle slopes near the mts. have mostly thin grass cover from mts.

the terrace is badly eroded.

More roads here than appear on maps.

In area of Hatillo - Tamalameque are grasslands, patches of swords and some palm savannas. El Burro

Landed at El Burro at 11:20 - grass strip east of Tamalameque.

Scattered tall trees here remaining from forest.

Some of the fields that appeared to be green scrub from the air are fields of manihot that are overgrown with a growth of weedy shrubs, vines and herbs 1-2 m. tall - several legumes Bauhinia, Jatropha, Cardiospermum, Ipomoea, Triumfetta, etc.

When allowed to remain for a time this develops into a dense tangle of shrubs and vines about 3 m. tall prickly, wiry, and impossible to penetrate or foot without constant and disagreeable labor with machetes. In places this is broken down and criss-crossed by trails made by cattle.

This area is of low rounded hills rather than flat as it appears from the air. However,

from here westward it is essentially flat. The hills are gradually ~~long~~ higher eastward, mostly denuded but with scattered trees left standing.

Left El Burro 12:50.
Wooded strips mostly are ravines or broken ground. Many of taller trees bare, probably ceiba. Ceiba
Northward are broad areas of forest, quite thick, probably semi deciduous, but only tallest trees bare now. Partially cleared. Some areas of grass with spots of forest. east of s. end of Lago de Zapatosa.
Then a mosaic of patches of woods, grass, clearing, low eroded hills. Burning going on actively. Some patches of typical savanna and all stages between forest and savanna. Grassland is intermediate stage in this ~~a~~ theoprogenous succession. Anime Line. Much grassland and gallery forest. Small spts called Filo de Anime wooded except ridges ~~of~~ which are ~~in~~ in part bare and eroded.
Then relatively flat

area almost completely in shifting agriculture. Some tall woods left but active clearing of these by process. Much second growth.
Then a stretch that is still more than half still wooded, then more and more clearing. Above Chiriguana savanna and grassland extends almost to foot of mts. except for narrow gallery forest along shallow ravines.
Then some large patches of forest alternating with savanna - gallery forest pattern. Always many palms. Large areas being cleared. Some of these converted to rather green grass. Most of savanna is reddish with just a light wash of green. Some spots eroded red bright orange-pink. Some areas in savanna, some in shifting agriculture, some still in forest.
Aspect becomes drier, more savanna, forest patches thinner, more obviously deciduous.
Very peculiar irregular purple-brown areas in savanna separated by pinkish sand.
Then large areas of deciduous

forest, some very good, some very degraded, some grass and incipient savanna.
Course generally north-northeast paralelling but away from Cerro Cerro de Perijá. Perijá
1:23 Deciduous forest becomes very general except scattered clearings, old and new.
Can see foothills ahead on both sides. Much burning in progress.
Forest here has a continuous green lower layer and a deciduous emergent layer. Some large clearings said to be for cotton.
Foothills on left are first isolated small ranges away from main Andean range. near Codazzi. More and more very flat cleared land, burning on every side going N. Ranges of hills almost completely bare and dry, even the grass largely burned off. Beyond the first large hills large areas of palm savanna, some often large trees left, some areas of forest. Less cultivated fields. The small ranges of hills are rough, of bedded rocks dipping east or southeasterly. Santa Marta Mts visible to left.
Much savanna and grassland, some forest left.

Now following Rio Cesar, valley widens - the center of a large flat plain. Deciduous forest and savanna form a mosaic of angular patches. The hills both right & left largely brush-covered. River not muddy.
Hills to east largely brushy -
1:41 to San Diego - Labaj - hills above these completely denuded.
Much of flat land is savanna with very large scattered trees. Some arboreal savanna, some bare deciduous scrub forest. Above Labaj are alluvial slopes with green scrub & scrub forest.
1:45 Valle del Upar. Much forest and park-land in valley - slopes of Sierra Nevada and alluvial slopes at base largely wooded except some higher slopes which are denuded. The west side of valley much greener than east side. Foothill ranges to east scrub forest, upper slopes mostly denuded except well up toward top where some forest remains. In Valley

as much park-land with grass and large trees, much scrub forest on alluvial slopes.
Lower ranges of ~~the~~ Sierra Nevada thinly wooded.
1.5: Scrub forest in valley extensive and becoming very sparse, mostly bare - really woodland. Park-land here less extensive and very dry
1.8 Uramita
1.11 Villa nueva.
Much open dry pasture and park-land. Then between here and Badilla (Fonseca) scrub forest varying to woodland, park-land and savanna. Mostly rather open. Many large spreading trees. On both sides lower slopes mostly covered by scrub forest
From here on the valley flora is almost entirely scrub woodland, probably thornbush, a few clearing near bases of mts on both sides. Thorn forest rather green but perhaps 1/3 of trees bare.
Upper slopes of mts on east about ½ cleared, on west perhaps more, to ¾ cleared.

Toward Rozario more clearing, in center of valley patches of very dry savanna.
2.05 Rozario - San Pedro de Cesar.
Many green fields, irregular patches of clearings, park-land and deciduous woodland.
Alluvial slopes and foothills on both sides covered by deciduous woodland.
Higher slopes partly wooded, some greener woods along Rio Cesar
2.09 Fonseca. Above this, along Rio Cesar a strip of park-land, otherwise thorn woodland.
Cerro de Perija becomes more wooded. Middle slopes of range on west side very bare. Aspect of low range on right of course very dry, almost all trees bare.
2.13 General vegetation a very dry thornbush with few green trees except along stream valleys, esp. Rio Cesar, where trees are large but well separated.
Cerro here a few clearings
2.16 Woodland variable, patches are greener, patches

very thin and dry.
Stream courses sharply outlined in green trees.
Vast areas of almost completely bare woodland.
2:20 Rio Hacha West northwestward a broad band of thick green woods in expanse of gray thornbush. Locally are scattered light green trees in thornbush.
2:24 Fewer green river courses except near base of ridge to east. This ridge rather well wooded, perhaps semi-deciduous woods.
2:27 Cuericita - some cleared land, pasture. Highway to Uribia looks passable for jeeps, perhaps
2:36 Occasional large dry pastures. Otherwise thornbush with some green watercourses.
Clearings become more frequent, much savanna
2:38 Maicao
Landing strip, oiled.
Three buildings out here in thorn savanna.
Shallow abrupt dry ravines meandering northward.
Large tree cereus. Tall-type acacia(s) or Prosopis, green. Much dry herbaceous & subshrubby growth in ground between trees.

Height of trees not more than 3 m except cacti which may reach 4-5 m.
Cacti only occasional.
3:40 Left Maicao
There is some extension of thorn savanna to east, especially on south side, but almost
3:41 immediately and abruptly it changes to desert or thin desert grassland with occasional patches of bushes or sandy patches.
Northward is generally a sparse scrub on what seems to be mostly drifted sand.
Perhaps the sand is caught by the vegetation or possibly the vegetation grows there because of sand. ~~To~~ This seems to be characteristic of flat area west of corner of Lake Maracaibo, but seems inland the same sort of thorn savanna as around Maicao but perhaps denser is almost continuous with some more open patches, probably drifted sand.
The general color is tawny with gray vegetation.
Cerro Peta is a roughly cone-shaped plug with a
3:54 thin scrubby vegetation except

1958 Colombia

on rocky knob at W/
the rock is pale yellowish.
Ahead is a watercourse
running to ~~Golfo~~ Maracaibo
Except for this, which has
a strip of thorn-forest,
the savanna is now
very sparse, but quite
uneven, denser to westward.
Would now certainly be
classified as desert, from
about 12mi 9ete westward.

7:02 Cordillera de ~~Cojoro~~ Cajera -
very dry, lower parts
tawny, with scattered uneven
brush. Higher parts fairly
well vegetated with what
appears to be a thorn scrub a
bush which seems to be
general on hilly area to east,
except on playas and braided
dry watercourse, which are
nearly bare.

11:04 Serrania de ~~Jarara~~ Cocinas - well
wooded with thorn bush -
a woodland - nearly leafless,
many arborescent cacti enough
in parts to be the dominant feature
of the vegetation. A small reservoir
~~to west north of this~~ between
ranges of this.
Two main ranges of this
running east and west, bounded
dissected country northeast

of this, with thorn-savanna
~~of~~ this very uneven, with
some completely bare areas.
There, in some cases, seem
to be ~~dry~~ dessicated pond,
some tiny Indian villages
with canals.

11:30 ~~Serrania~~ de Jarara - a
high rugged range with
a curious contrast in bright
parts between a red rock
and gray talus or scree slopes.
In upper parts the vegetation
is a scrub with scattered
bare trees, in lower parts
thornbush. Some green
in bottoms of ravines.
This range is fairly
extensive. In flatter
valleys are many large canals,
completely bare of vegetation
except an occasional spartina.
~~Valley~~ Plain north of this
somewhat irregular, partly
wooded with thorn savanna,
partly ~~or~~ absolutely bare and
eroded.
Watercourses here have
little more vegetation along
them than the surrounding
country.
Generally a fine mosaic of
completely bare eroded areas
and patches of dry grass (tan)

and scattered shrubs & small trees, all bare

4:13 Presently north of Sierra de Chimana, but turned back directly west. over almost barren Desert type of erosion, but colors only gray, ~~and~~ brown, and tawny.

A few low ridges ~~E~~ S north at an angle to coast North coast appears, from distance, to be rather extreme desert. Some very large apparently very shallow lagoons. Apparently lined with mangrove swamps, at least east of Bahia Honda. these very irregular in width

Large area southeast of Bahia Honda is absolute desert, very smooth and flat. probably salt flats Some eroded slightly higher ground immediately around Bay is eroded and has scattered brush.

Large bay called El Datete on map has mangrove swamps on east side but these appear to be somewhat deciduous.

Salt flats ? on south side Higher ground with thorn savanna or northwest, Narrow mangrove fringe around west extension. Large flats

of ~~other~~ extreme desert west of El Datete, and general landscape west of it desert and thorn savanna mosaic. South of Cabo de la Vela the bay is lined with dunes and east of these are bare salt (?) flats, very smooth, without vegetation. Coast southwest from here has a broad belt of such flats, back of a narrow belt of dunes immediately back of shore. Dunes have some vegetation.

Back of the said flats seems to be ~~so~~ thornbush.

4:44 Carrizal - tiny village in dunes along coast.

4:47 Puerto Estrella (on a lagoon?) - another tiny village, beyond which the salt flats are flooded, forming a lagoon. ~~Flat~~ Its. The salt flats extend a short distance beyond the lagoon, then the thorn bush reaches the beach. A considerable interval, more than is noted on map, before the first of the lagoons, at

5:53 Manaure is reached. Here is a large salt pan and extensive lagoons and

salt flats extend along the coast from here on. A beach ridge with vegetation separates the salt flats and lagoons from the sea. At s.w. end of large lagoon is a series of vegetated concentric beach ridges curving in toward lagoon, then a small outlet. Then extensive desiccating lagoons and salt flats in places with scarcely any beach ridge. The flats here are white rather than tawny - apparently a crust of pure salt, some sandy ridges in it with vegetation. After this broad bare flats, dull tawny in color, extend along the coast behind a well developed coastal dune ridge, this with bushy vegetation. Evidently the tawny flats are sand, some slightly higher spots vegetated. All along back of the flats is relatively level country with gray thorn bush. ~~Last flats also~~ The sand flats extend to just before the big lagoon just east of Riohacha. There are also rather bare flats back of

this lake but the thorn bush extends out onto the narrow peninsula east of it and leadingin to the bar that separates it from the sea. This bar has apparently herbaceous vegetation. Slight mangrove swamp at west end of this lagoon. The sand flats extend to Riohacha. From there on is thorn forest, to the top of the beach for a good distance.

A few miles southwest of Riohacha is another extensive flat, rather sandy, and a stream mouth with sand flats on both sides. Then the first of two large lagoons, with extensive sand flats east of it. The second lagoon seems to be almost dry, except in center, where there is a little water. The dried bed is very salty. S.w. of this another small flat and some grassy dunes. Otherwise thorn forest or semi deciduous forest near the coast.

Possibly some swamp, but clouds cut off visibility. At least some water in a greater area than the surrounding

forest.
5:17 Loma.
5:19 Dibulla
Considerable cleared land around Dibulla.
Some to west possibly low and marshy.
5:20 The coastal area here is mostly open and quite open, possibly marshy, considerable forest, but clearing and burning going on. Some rather dry pasture on flat area. Some low hilly land with forest. Then alternating low wooded hilly flat forested land, swamp, low hills with semi deciduous forest, then considerable reasonably developed gently sloping forested land. This forest mostly evergreen except tallest trees. Some cleared land near coast growing back to brush
5:24 to large river with cleared flat land along it.
Then the coast becomes rather abrupt, densely wooded mountain slopes, with an abundance of large Tabebuia in flower, rose and greenish white (Cuipo!) These slopes seem undisturbed right down to sea

5:24 Then a flat area; newly cleared; partly planted to bananas (?), then a narrow coastal reasonably flat strip, partly cleared, both of which are steep forested slopes.
5:29 Then extensive clearing near mouth of large river, issuing from a canyon. Then more flat cleared land, rather narrow coastal terrace, certainly not generally more than ½ km. wide.
5:30 another river valley and extensive clearing, broader terrace west of this, partly cleared
5:32 another stream, then the
coast becomes abrupt again and wooded to the shore. Some clearings in flatter places, and narrow stream valleys. Then a cabo San Juan de Guia. The mountains above this coast are extremely rugged and densely forested to crests of crested ridges. Forest on crests is dwarfed, typical montane forest.

1958 Colombia

west of the cape The aspect becomes gradually dryer. Some clearing at head of bay. From ~~a~~ coastal bluffs and headlands rapidly changes to a dry ~~scrub~~ deciduous scrub or thorn bush which surrounds the several beautiful bays. Higher mountain slopes still have wetter forest but only above 1000 m. & somewhat more.

This coast is very steep and has low wave cut bluffs. Aspect drier as Santa Marta is approached Wave cut cliffs are almost white. Soil above is red. Back of Santa Marta the flat land is largely cleared some thorn bush. Hills scrub covered.

Valleys south of Santa Marta green mostly in bananas. Shade trees. Hills scrub forest or scrub, some slopes bare.

Alluvial slopes above air strip have thorn forest, small part cleared.

Flats south of where coast turns west in bananas. Low lower spurs of mts.

south of airport bare and eroded.

April 11 The thorn forests on the lower slopes are about 5-7 m. tall, leafless at this season. Cereus (Démaireoides) of a fastigiate habit are abundant, Bursera, Pereskiopsis also, and several legumes. Undergrowth of leafless shrubs and an abundant large Bromelia. In the flat valley mouths, where there ~~is~~ no cultivation there as a thick scrub about 1.5 m. tall of a green Prosopis or Acacia, flat topped, forming a continuous canopy. The thorn forest comes down to the ~~coast~~ flat ground in places, practically to the beach.

Around Ciénega are banana plantations, some coconuts near the sea, Mangrove swamps abundant but not continuous around the eastern edges of the Ciénega. Much open water in them. Banana area south of Ciénega along the foot of the mountains is perhaps ½ - ¾ planted to bananas. Grassy fields sometimes with scattered bushes & small trees make up the rest. This pattern extends south to Guabamagal.

where the plantations become almost continuous. A broad belt of plantation, with occasional grassy fields, extends to Aracataca.
Fields are crossed at interval by irrigation canals and ditches.
Some sugar cane near foot of mts., not much.
West of the plantations and south of the Cienaga, the land is mostly cleared and in pasture, locally with many palms left standing. From the appearance of the remnants the original forest must have been a ~~deciduous~~ or semi deciduous forest with an abundance of palms.
It may be partly flooded at high water.
Around the shores of the cienaga on all sides is a broad belt of mangrove, and mangrove islands and strips in the lake itself forming a labyrinth of channels.
West to the Magdalena is a complicated area of ponds with floating vegetation, bare saline soil, meadows, slightly higher sabana areas of

scattered palms, dense grass that may be Paspalum, patches of mangrove.
A canal connects the river with the cienaga. Near this the land is mostly inundated; even now. Some higher sandy areas cultivated ~~Mouth~~ esp. across from Barranquilla. Much burning even in the marshes.
In the middle of the cienaga ~~are~~ are two towns on pilings, one of them, Nueva Venezia, quite large, with churches, etc. as well as large number of houses.
Below Barranquilla, east of the river the land is mostly inundated or marshy. Mangroves line the east bank. A tremendous breakwater or jetty ~~forms~~ makes up the west bank and projects far out to sea, & conducts the silt out of the port. West of this are lagoons with considerable mangrove.
The mud from this river mouth a "boca de ceniza" colors the Caribbean as far as one can see.

The land to the east of the extreme end of the entrance seems completely bare, landward becoming gradually ~~so~~ grassy, then great brakes of reeds with some brush. It appears that waves sweep completely over this projecting part during storms.

Leaward of Barranquilla itself is flat land with deciduous scrub forest and woodland, mostly bare now. Between Barranquilla and Soledad airport is a similar vegetation but much sparser, more scrubby and disturbed, with a network of cow paths, some of it savanna, some just dry grass. South of Soledad much of this has been cleared for cultivation and is in various stages of regrowth.

17:45 Left Barranquilla for Cartagena.

Tolu

Same pattern of various stages of regeneration of scrub and condition of overgrazing west of Barranquilla as south of Soledad. A little farther west there seems to be less overgrazing, but somewhat more land cleared for agriculture.

following the coast southwestward, less clearing, some rather low relief, showing spots of serious erosion, tawny against the gray-brown of the scrub forest.

11:50 Manaturma - Rough area here partly wooded with fairly good deciduous forest.

There some flat areas that are cleared, with a pale buff soil, and areas of same relief with deciduous forest and scrub forest.

More flat cleared land, narrow green gallery forest & scrub along dry watercourses.

Inland a mosaic of deciduous scrub forest and cleared land.

11:59 Some relief, with deciduous forest, with intervening cleared flat land.

Much clearing and burning going on in the patches of forest that are left, obviously the ~~so~~ rate of clearing to be seen far exceeds that of regrowth.

12:01 Serious overgrazing

12:03 Punta de la Galera - salt pans on east side of point.

Back of point some fair deciduous forest.

12:24 Ciénaga del Totumo - a shallow very complicated lagoon with some slight mangrove development, opening to sea.

~~Boats~~ West of Punta de la Galera a very striking parallel series of bars curving south and inward.

Around ciénaga the flat land is cleared and overgrazed the rough land with deciduous woods being cleared and burned.

12:08 A small crater-like pond surrounded by green forest, back of an extensive salt flat extending back from the point.

Turned inland. All of this area has much the same pattern of cleared flat pasture and wooded hills being cleared and burned. Inland there are more and more green trees and bushes, a few bananas planted here and there in ravines. Many palms scattered locally in the pasture. Circled over the area northeast of Cartagena. Several small reservoirs. Country generally very overgrazed.

12:16 Santa Catalina

12 fires visible at one time from plane at 1750' alt., many more

burned areas.

Some poor looking bananas patches east of Cartagena. Mangroves around bay north of Cartagena, forming a very complicated pattern.

12:44 Cartagena. Hill between the two bays covered by deciduous scrub forest, but even on this a burned area.

Much less mangrove around bay south of city. Some on north end of Isla Tierra Bomba, a little bit around other points. The island generally covered by deciduous scrub. North end of Isla de el Rosario with considerable mangrove development. The island itself a mosaic of scrub woodland in various stages of regeneration.

Head of Bahia de Barbacoas lined with a very considerable mangrove development, also its east and southeast shore outside the Canal del Dique, a little to landward of canal, also many sandy areas and desiccated ponds in these mangrove swamps. Some patches of higher ground with deciduous trees. Very complex mosaic.

1958 Colombia

The interior of the large swamp area of Punta de Bahoreo is probably fresh water swamp. South of this is an area of ~~bare~~ brown overgrazed savanna, and patches of woodland and scrub. The coast is lined by a narrowing belt of mangrove swamp. Some low wooded hills just back of coast, increasing inland. Here also much burning and clearing

Southward these hills get lower and lower, more and more burned and denuded. On flat ground is extensive palm savanna.

Mangrove belt has practically vanished

~~The~~ Palm savanna very extensive. The palms seem to resist, somewhat, the burning. Some scrub forest with many palms. Scattered large Ceiba (1) along the ravines

Much burning in low hilly
17:49 area back of Punta San Bernardo. Some spiny deciduous and palm forest left inland from point. Extensive grassland and open savanna farther inland.

Mangrove belt along Golfo de Morrosquillo much narrower than shown on map.

Inland from there extensive palm savanna "Los Sabanas de Bolivar". Some semi-deciduous forest along coast. Some marsh and swamp back of this, but not extensive.

12:56 Tolu - back of it extensive savannas. South of it a tiny landing strip. South of this a very narrow belt of swamp, back of this considerable open woodland.

Around Tolu some crops. Woodland in various stages of regrowth. Backs of woodland some palm forest.

1:00 Landed at Tolu.

Mangrove swamps here very dense, Trees up to 10 m. Mostly Rhizophora, with aerial roots originating as high as 6-7 m. and hanging vertically. Some Avicennia. Hibiscus tiliaceus. Thespesia populnea planted along beach in front of town.

2:44 Left Tolu, for Cartagena going considerably ~~inland~~ southward inland savannas inland from Tolu have green trees and bushes, mostly palms. Very few patches of woods left, these green

or partly green, palms and ceiba common. Going inland the woods become less green, but there are narrow gallery woods along streams and ravines. Smoke from burning is so thick that visibility is poor. Many patches of palm savanna, patches of grassland without trees

came to a rather high range of hills, wooded somewhat along the top of main ridges and in places on the slopes with tall forest, semi-deciduous to deciduous, many palms in lower parts. Cleared slopes mostly scrub-covered, scrub deciduous, some bare and planted to something or in pasture.

Followed this upland eastward. Hills get lower and more denuded, very rocky.

Country to east is hilly and very much denuded. Ravines tend to be wooded and green. What wood there is on slopes is deciduous.

Sincelejo. Turned northand northwest. Vast savannas and grasslands, some patches of scrubby second growth, especially on hilly areas. Smoke so thick that there is no

visibility in mts. to west. They seem more or less bare below, with woods on higher ridges.

Hills along coast more or less scrub covered, with green to bare woods in ravines.

Northwestward, hilly to mountainous country, mostly bare but with many irregular patches of green second growth. Then hills that have some deciduous woods then more bare ones. Most of open area recently burned over. Considerable flatish burned over land then the strip of lakes and marsh and swamp complex along the Canal del Dique, east of Corfem. The woods here are green and contrast sharply with the brown savanna on both sides.

Northwestward a mosaic of cleared land and woods, south and east of Arjona. West and north of it almost all is cleared and much of it covered by low scrub, some grassy with scattered trees some scrubby wood in hilly places, but far more low scrub.

around Turbaco almost all is cleared, mostly overgrazed and covered by a thin low brush. Some second growth wood on escarpment between the terrace around Turbaco and the Cartagena plain. Cartagena plain cleared and overgrazed, some areas of open to deciduous woodland. Mostly grass, ~~bo~~ scrub, and savanna.

Trip by car to Turbaco - hills of hills near Cartagena are gray or gray brown, darker near surface. Those of the low flats are black to a considerable depth, appear very fertile. On rolling ground toward base of the escarpment subsoil is gray brown to dark brown, the ~~surface~~ subsoil gray-brown, lying on a dense semi-consolidated clay. Here the plants look much greener.

The escarpment is of ~~marl~~ limestone. The soil on top is a dark chestnut brown or chocolate brown when moist.

Cartagena - most of the coconut trees here are diseased, characterized by extreme shortening of leaves, then death

mud volcano
a field of several hectares of very low cones 1-3 m high, with considerable area, with craters in the top from which slowly bubbles and oozes a gray fine mud and a certain amount of an odorless gas. The mud cracks into polygons with desiccation. The area is irregular, mostly bare of vegetation (except about ~~[illegible]~~ 1/10-1/20). Dense clumps of a sedge. Very few ~~[illegible]~~ it with Bromelia on ground.

Bubbling produces sound like plumbing ~~bubbles~~ in a ~~half~~ barrel ~~of~~ water, or like certain frogs
half full of

No obvious relation between activity of neighboring craters.

Craters vary in size from several cm. to about 1 m., mostly less than 30 cm.

Some of them seem to issue from a very narrow throat others very broad, probed with a pole to 2.5 m. before encountering

resistance.

The mud is gray, tastes very slightly alkaline, is coarse enough so that the particles are felt between the teeth. After exposure to air the surface turns rusty brown, but not rapidly.

On the surface of one of the pools was a circular patch of a brownish oil-like material. One of the local people said that at times the production of mud was much greater, especially during the night, and that the amount of oil on the surface was at times much greater, also. He said, also, that there were other areas of these volcanos also.

The mud is firm enough to walk on soon after emission.

The temperature is very slightly below body temperature as judged by feeling several of the more active pools.

Some of the craters have a distinct rim, others are merely rounded on top.

The cones 3 m. high are compound ones and do not stand that high

separately. The character of the slopes varies from straight and very low to definitely tending to be hyperbolic.

Apr. 12 - Cartagena to Barranquilla via Turbaco.

Photographed mud volcanoes from air. Unable to locate any more, except possibly one small patch situated in a depression on top of a low hill some distance north east of main area.

The main area is definitely on a somewhat dissected terrace.

East of Turbaco the country is hilly, largely burned over, covered by secondary deciduous scrub or scrub forest in various stages of regeneration.

Approaching Repelón there is some level cultivated land very dry now, overgrazed pastures, and some savanna with green trees.

East of this is a vast complex of lakes and ponds and seasonally flooded land. Some green floating vegetation forming large rings, festoons

1958 Colombia

and patches in Ciénaga de la Guajaro. East of this savannas, burned over and overgrazed hills and flats, a patch of palm savanna, watercourses with green trees, these large and spreading. Locally north of Sabanalarga some serious erosion on hilly plains.

Grazing even more intense east of Barranca and northward to Soledad.

April 13 - drive out of Barranquilla.

Cordia sebastena weed much used as street tree in Barranquilla also Delonix. Ixora casei and I. coccinea common. A red flowered and an orange flowered form of Cordia sebastena. Casuarina common, also Pritchardia pacifica.

Calotropis is common as a weed around outskirts of city.

Where there has not been very recent clearing and no grazing (or road To Puerto Colombia, the vegetation is a scrub forest of bare trees up to 6 m. tall.

of several species not identified except that one is a Crescentia. Undergrowth too dense to walk through, mostly bare but some species green, up to 3 or 4 m. high. The whole is tangled with woody vines, also mostly bare. Most of these plants are not spiny, except a small palm with excessively spiny stems and a Theophrasta with leaf tips spinescent. Also what appears to be Pisonia aculeata, completely bare of leaves but with flower buds. Cordia rather common with green leaves, white fls.

Across street, where the land is fenced, the undergrowth is broken down by cattle.

Soil here is a gray sandy loam but is rather thin on a white chalky soft rock, occasional small bits of coral and brown sand.

Fence posts all living trees of Gliricidia sepium a "mata ratón", which seems to be universally used for this purpose here.

In ravines the trees reach at least 10 m. in height. A species of Sterculia is evergreen and conspicuous but not abundant.

Pereskiopsis with long

needle-like spines and a spiny Pithecellobium ~~sp~~ rel aff. here found but rare Large Cereus is rare.

Road to Boca de Cenigas - much industry, especially on river side of road. Vegetation low and weedy a thicket. Beyond industry a patch of bare sand dune crescent shaped, moving away from river. Then a low leguminous scrub, mostly green, some Cereus. Scrub generally 1.5 - 2 m. high, maximum 3 m.

Farther out the scrub is lower, more weed & xerophytic. Cacti become common.

Then mangrove swamps alternating with consolidated dunes. On the dunes is a rather thorny scrub of Acacia? Randia, Cereus, Thespesia, ~~Bursera~~, Opuntia, etc. 4 m. tall.

cr.

On flat low ground between patches of mangrove are ~~Bursera~~ Distichlis? and Batis maritima.

The mangrove here is Rhizophora sp. and is mostly quite low, 1-3 m. but occasional trees that have escaped

cutting for a time are up to 7 m. tall. Prop roots are present but not well developed.

Above a certain tide level the Avicennia survives cutting and sends up sprouts. However, out in the flats that are submerged large areas have been cut and have not recovered. It is possible that the stumps represent some other species, of course

On the low bluffs landward is a spiny scrub of Acacia sp. and a number of other bushes including a very spiny and painfully stinging Cnidoscolus with a bulbous stem. Though grazed this scrub is still very hard & walk through it is about 3/4 deciduous.

Acrostichum aureum common locally in the mangrove.

On way back, green leguminous scrub is on flat low ground, giving way to deciduous as soon as slightly higher ground is reached.

1958 Colombia

April 12 - Buriaco mud volcanoes about 6-8 km. e. of Turbaco, s.e. of Cartagena

39413 3 Fimbristylis
the only plant on the mud volcanoes

April 12 - e. of Turbaco, s.e. of Cartagena
in second growth thickets
with preceding collections.

1 14 Cassia
1 15 (spec.)
occasional

April 12 - south of Barranquilla on road to Boca de Cenizas, Atlantico
on consolidated sand dune just above mangrove swamp

2 16 Randia
common in deciduous scrub

*1 17 Conocarpus erectus L.
occasional just above mangroves

April 12 - west of Barranquilla on road to Puerto Colombia
in dry deciduous forest

2 18 Crotalaria
common in ~~scrub~~ clearings.

4.1 19 Cordia
common ~~in~~

densely caespitose, forming patches.

— fruit immature.
shrub 2 m. tall, flowers white, contorted, fragrant.

2 m. stiff shrub 2 m. tall.
— fruit black.

1 m. small tree ~~4~~ 4 m. tall.

5 m.

low suffrutescent herb
standard lavender, lined with
— purple, keel deep purple.
shrub or small tree 2-4 m. tall
flowers white, fruit immature;
buds curiously appendaged.

1958 Colombia

April 14 - between Barranquilla and airport Soledad.

The deciduous woodland has between the trees a rather thick herbaceous ground cover, now completely dry. The trees are mostly spiny acacias about 2-3 m tall. Farther away are some larger bare trees, perhaps 3 m., widely spreading. Cacti are common - Opuntia and a low cereus.

Gliricidia sepium is present as living fence posts, fully leafed out and green.

April 14 - flight Barranquilla - Tocumen, Panama (1 hour 35 m)

Calotropis ~~very~~ abundant around airport, locally.

11:54 a.m. took off.

Open grassland between airport and Rio Magdalena, also an island in river.

Barranquilla is a great sprawling city with many trees in residencial areas, rather concentrated business area.

Deciduous woodland with scattered green trees northwest

of city. Watercourses lined with green trees. Some open low grassy fields.

A few small ponds made by damming ravines - water very green.

Many small burned areas.

12:00 p.m. Puerto Colombia - port with no harbor - pier projecting beyond bar which encloses lagoon.

From here went out to sea. Rather muddy apparently shallow water for a considerable distance, bounded very sharply by blue water - perhaps this is not shallow but is merely the mud from the Magdalena.

12:05

1:06 Over archipelago de las Mulatas (San Blas Is.) - Cayos Holandes, Cayos Diamon - apparently a compound barrier reef with small, apparently quite dry islets with white sand showing through woody vegetation - interior of islets - apparently a very thin coconut plantation. The coast of the Isthmus is here a typical drowned coastline - San Blas Peninsula has a fringing reef on its outer side, a barrier reef around its tip and no reef inside around the Gulf of San Blas. In the gulf near the

mainland coast are
several ~~tiny~~ inlets ~~with~~
~~bays~~ are completely covered
by thatched houses, crowded
so closely that no ground
shows. The coast of this
bay shows much shifting
cultivation, inward for
perhaps several km.
After that is solid unbroken
rain forest until first
small river is crossed, along
which are scattered clearings,
and others from here on.

1:03 Approaching a largely cleared
valley
Ridge-tops in part with
dwarfed vegetation, some
bare and brown, obviously
burned.

1:10 over airport. Country
~~around~~ around it bare,
burned over, showing patchy
red and pale buff soil
23 fires visible at once
toward canal zone.

1:14 Approached Tocumen -
fires in all directions
some ~~veg~~ forest along streams

has escaped burning
Grass is mostly brown and
dry.

1:20 Took off from Tocumen.
Soil here is generally reddish.
Along the Pacific coast
there is a well developed
but narrow belt of
mangroves as far as
Panama City. The coast
is remarkably straight.
Visibility very poor after
leaving Panama City.

1:50 Clouds cleared away
revealing a fantastically
complex drowned coastline
or lake. The country around
it green, largely in
shifting cultivation, but
partly forested. Hilly.
Soil bright red.
Apparently this is the
southeast extension of Gatun
Lake.
Between here and the coast
west of Penonome is forested
country but showing many
clearings in various stages
of regrowth, some fresh ones.
Small streams entering
all along this coast have
very black water, at least viewed
from high altitude.

1:56 left coast.

3:27 Passed Isla del ~~Coc~~ 7 mi. in distance to left. Poor visability. Considerable open country along coast northwest of this. Probably banana plantations.

Costa Rica

3:34 Puerto Limon — Peninsula is about half cleared and planted to something in geometrical arrangement — possibly citrus. The rest wooded. Coast northwest of here very straight

The shore is a dark gray rather narrow beach.

Close in are masses of very muddy water whose origin is not evident. Back of the beach ridge is a vast area of swamp with black-water and rivers running through it are green (photos)

3:39 Crossed a very muddy river which probably is origin of the mud, which is evidently swept southeastward by a long-shore current, as no mud seen south of the river. Probably the river running down from Matina.

Northwest of here solid dense forest.

3:45 Some patches of grass, origin

not obvious (photo). Possibly old clearings, but no evidence of recent human activity

4:46 Very small grassy areas along small meandering streams.

4:47 Many small very irregular ponds. Black water.

Then more grassy spots.

4:49 Then a large area of grass with abundant patches of trees. Two very muddy small rivers — this may very well be the work of man.

Rivers

4:52 Large, very muddy Rio San Juan, with some bleaching along banks. South, west of it and areas of complicated grass and forest mosaic, similar to that noted above, but very evidently wet.

Many irregular areas of fine textured vegetation in the forest near river — probably swamp.

4:54 Hills with dense forest for as far as eye can see to northeast. Relief rather low but dissection complicated.

4:56 Abundant bare emergent trees in ~~area~~ what appears to be dense rain forest. These become more and more

abundant. Much clearing along rivers.

4:07 General aspect of forest becoming
5:00 dryer. Clearing more frequent, dry looking, many recent ones. Much burning going on.

4:51 Crossed a low range of hill
5:02 transverse to course. Then more hilly. Forest takes on a semi deciduous appearance.

5:04 Forest gives way to grassy hills
5:04 East of lake with savanna thin forest, grass mosaic some cultivation.
East ~~end~~ of lake appears to be quite dry and brown wherever outside have been cut away.
Visibility over lake very poor Isla San Bernardo (?) very dry.

5:16 Passed a very symmetrical volcanic cone on left which blew a nice puff of smoke as we passed. Base hidden by haze, so it is not possible to tell if it is Ometepe or one of those to north.
We are above a diffuse dusty looking haze that cuts off view entirely

5:26 passed head of lake - country

very dry.

5:28 Passed Managua.
Everything very hazy.

5:32 Tiny island in lake Managua - wooded except for dry grassy ~~west~~ west slope

5:37 Volcano ~~west~~ east of Monotombo - smoking now, rubbly slopes reddish ash or cinders, top rounded, lower slopes sparsely wooded.
Cordillera de los Marabios generally sparsely wooded except upper slopes around craters.
Middle peak of young mass has a round sharp hole on the west slope just below the top.
Country at base is most intensively cultivated but very dry. Hedgerows between fields.
Some slight smoke from several other most craters several wooded lava flows on west slope and not below.
Much burning at base and lower slopes of highest outlying peak of range.
Possibly the smoke from the burning is responsible for the haziness and poor visibility, as many fires can

1958 Nicaragua – El Salvador

Intensively cultivated country continues northwestward
5:43 low, low sparsely wooded hills, locally cleared, various stages of regrowth.
These continue onto the peninsula south of Gulf of Fonseca
Great bare flats along the south side of gulf, separated from it by a vegetated beach ridge. Flats seem to have no vegetation at all.
Huge crater on mountain on peninsula, smoke issuing from many places on slopes of mountain but not from crater. The sides appear to be of scoria or lava, covered by a woodland of rounded green trees.
Wave cut cliffs along coast northeast of Punta Cosiguina.
5:54 Punta Amapala – Mangrove swamps around bay back of bar of point.
West of this a long very straight pale gray beach.
Back of this a long inlet parallel to coast, lined with mangroves.
Back of this dry mountain slopes, mostly cleared but some forest left on higher slopes

westward. Hilly country, dry, mostly cleared
6:00 passed a very symmetrical cone to north, with a crater in top – not active.
6:01 Usulután – country very intensively cultivated.
6:02 Another cone, lower but closer, smoking some, badly eroded, slopes steep.
Visibility very poor because of smoke
Mountain slopes west of this steep, wooded, lower slopes and lowlands cleared, dry.
6:04 Crossed Río Lempa. Wide sandbars. Country cleared, dry, more level parts cut up into fields separated by hedges.

6:07 Approaching San Salvador – Ridges radiating from volcano – ravines wooded, slopes and ridges bare and dry. Streams with little water, clear
dense woods on tops of hills east of Laguna de Olopango. Sometimes steps up into lake.
This lake is probably a large caldera.
Country west of Lake

1958 El Salvador -

cut into intricate pattern of bare pale ridges and wooded ravines.
Slopes cultivated when possible.
Soil apparently a light grey ash.
Many towns in San Salvador. Some wooded on slopes above city.
Plants planted in pits on slopes. Sugar cane and bananas on level ground.

5:08 took off from San Salvador (clock back 1 hour) for Guatemala.
Inner slopes of Ilopango caldera mostly cleared, grazed or cultivated.

Very deep parallel gullies separated by sharp ridges cut in pattern ~~cut~~ north sides.
Gentle ash slopes above this leading up to volcano near summit, cut very intricately by deep eroded gullies. Cleared except ravines.
Smoke very thick visibility very poor.
Many of gentler slopes in sugar cane. Country generally cleared, cultivated & grazed.
Hedgerows between fields.

This pattern continues, except for some deep brushy canyons, cultivation becoming less, but clearing still almost complete.
5:13 Then little or no visibility
5:22 Arrived Guatemala, smoke and clouds very thick -
Deep gorges cut in tableland of volcanic ash - walls wooded where not too steep
5:39 Landed.

6:22 p.m. Took off.
Ravine heads vertical, with gullies running to them above - how does this come about?
Visibility about zero after any altitude is reached.

19200